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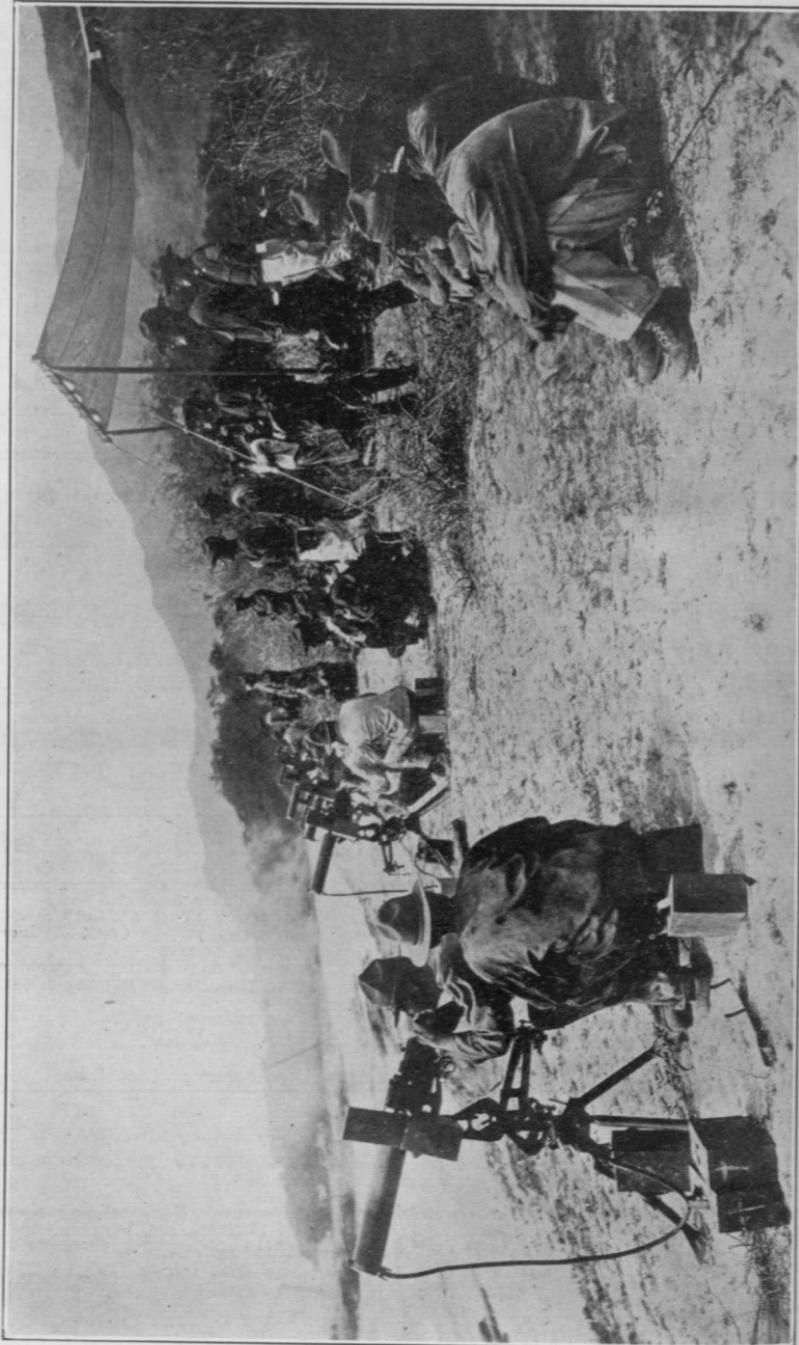
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The Coast Artillery Journal

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The Mission of Coast Artillery

By BRIGADIER GENERAL JOHNSON HAGOOD, U. S. Army

An address delivered before a conference of Coast Artillery Reserve Officers, New York City, October 20, 1924; and repeated by request at the Conference of the Second Corps Area Line and Staff School, January 15, 1925

IN discussing the mission of Coast Artillery, let it be understood that I am discussing the matter upon broad lines. I have reference to a well recognized function and not to the particular duties at present assigned to an arm of the service. The Coast Artillery function may be performed by a separate corps of the Army, as in our case. It may be performed by certain regiments assigned to that duty, as in the case of the British Garrison Artillery; or by the Navy, as in the case of the French; or by certain batteries of a regiment, designated as heavy batteries, as in the case of the Artillery prior to 1901. But there is a Coast Artillery function just the same as there is a Cavalry function, irrespective of the arm of the service to which this function is assigned. That function is manning the guns of the harbor defenses.

The Coast Artillery Corps has certain duties assigned to it in addition to manning the guns of the harbor defenses; such, for example, as submarine mines, antiaircraft guns, furnishing a quota of officers for detail on the General Staff, etc. It is not my purpose to discuss the relative importance of these several duties, nor to raise any question as to which of these duties should be attached to the Coast Artillery Corps and which ones should not. I only propose to discuss the mission of the Coast Artillery Corps in the performance of its main and generally accepted Coast Artillery function:

Besides the duties above referred to, the War Department has assigned certain other missions to the Coast Artillery Corps for training in time of peace. In time of war all troops must be used in the manner indicated as best at the time. This is a matter of expediency and will be determined by the character of the war. And there is little probability that in time of war Coast Artillery troops will be used exclusively on Coast Artillery duty.

It is not my purpose tonight to discuss these other missions. The mission of Coast Artillery is to provide safe harbors for the ships of our own fleet and to deny safe harbors to the ships of the enemy.

A distinguished general officer who has had some experience with Coast Artillery, said to me recently in a letter: "The Coast Artillery has a great future before it as Army and G. H. Q. Artillery." Another general officer, equally distinguished, but with less experience in Coast Artillery, said to me recently: "The railroad artillery and the tractor artillery have saved the day for your branch of the service."

I take issue with both of these authorities in my firm conviction that the Coast Artillery has a great future before it in the permanent fixed defenses, and that railroad and tractor artillery is now, and will be for some time to come only an auxiliary to the main defense.

When we first came back from the war we were carried away with the idea of a great artillery reserve at some place like Pittsburgh, ready to dash out to a threatened point and to dash back when no longer needed. We talked about strategic railways skirting our frontiers with selected positions prepared in advance; and few, if any of us, estimated the cost and realized that it was about as impracticable to do this as it would be to build a roof over the United States to protect us from airplanes.

Railway artillery was used of course during the Civil War. It was suggested for the Island of Oahu (Honolulu) by General Arthur Murray fifteen years ago. I myself submitted a crude plan for its employment at Cape Henry, Chesapeake Bay, some time before we got into the Great War. But the more you study it in detail, the more you become convinced: *first*, there are very few places where railroad artillery could be used to advantage; *second*, that it is much better to put in a fixed battery at the place you want it. Then you know it will always be there when needed; *third*, that it is cheaper to put in all the guns needed at all places, than to build up a reserve to be shifted about; *fourth*, that except in cases of prolonged siege, railroad artillery from a distance would not arrive in time; *fifth*, that the protection given to railroad artillery by its

mobility is more imaginary than real. It cannot be moved during the course of an engagement, and if the configuration of the site is such that it can be moved about to any great advantage, between fights, the same site would permit the construction of fixed batteries in scattered and well concealed positions. Moreover, the modern fixed battery offers a smaller and less vulnerable target.

But whatever side we may take in this question, it has apparently been settled by Congress. A program is under way for twenty-eight 16-inch guns to be installed on fixed mounts, and of guns on railway mounts, we have only four 14-inch. It is not at all likely that this situation will be materially changed within the near future, and, if any of us here present ever comes to fight a coast defense war in this vicinity, it will be with the fixed defenses as they now exist, supplemented by 16-inch guns at the eastern entrance to Long Island Sound, and with such existing models of railway artillery as are considered available for us for this purpose. For seacoast work this is the 8-inch guns and 12-inch mortars built for work in France, with ranges from fifteen to eighteen thousand yards.

As to the use of railroad artillery in land warfare, I cannot see it. I can see our Coast Artillery near Verdun shooting up Conflans and Etain. But I cannot see it shooting up Boston or Chicago.

So much for the question as to whether the Coast Artillery is to be tied to the fixed defenses or to travel about on the railroad. I will now pass on to a broader question.

For a great many years, our National Defense against foreign invasion was based upon a very definite policy. A good policy though not well executed. Recently we have changed that policy, though I for one, cannot see what has happened during the past ten years to warrant such a change. In fact, it seems to me that the experience of the Great War, the disarmament conference and all other military and political events bearing upon this question have shown that our old policy was right, except that we did not go far enough in putting it into effect.

This old policy—brought up to date, was based upon the following:

(1) That the first line of defense is the Navy. That with the 5-5-3 program fully adhered to, and the Panama Canal open, we are in little danger of invasion from the other side of either ocean.

(2) That the second line of defense is the Coast Artillery. That with every harbor bullet-proof, our Navy would be free to operate on the offensive, with absolute assurance of convenient and safe refuge for itself and no refuge for the enemy.

(3) That the third, and last line of defense is the great army of the people and the great natural resources of the country. That this great force will not be brought into play until our navy is swept from the seas, and our harbors, sealed from the front—are turned and entered by the back door.

But in the enthusiasm of our experience in the Great War, we have been swept off our feet by the importance of organizing our third line of defense. And, in comparison, we have neglected our second line and have allowed it to become weakened to an alarming extent. Though our Regular Army is five times as great in size, the number of regular troops assigned to the defenses of New York City is actually less than it was before the Spanish War. For the country at large, two-thirds of the permanent fortifications have either been abandoned or placed in the hands of caretakers.

If there is any blame for this situation, where does it lie? I think it can be explained by the fact that as in the case of the Cavalry, the Coast Artillery, as such, did not participate in the war. Officers of Coast Artillery who had never had military experience above the dull routine of peace-time battery duty, found themselves commanding battalions and regiments in the fierce excitement of war. When they came back to the old jobs, or contemplated such return from a distance, their minds naturally turned to the days of the war, and they began to develop ideas as to how their own experience could best be put to some practical use in connection with Sea-coast Defense. And all this experience led them away from the fixed guns and centered their attention upon beach defense, the command of mobile guns, and later, perhaps brigades and divisions.

Now let us give some consideration to this matter of beach defense. Strategy is common sense, and we can examine the subject from the standpoint of ordinary common sense without submerging ourselves in a flood of technical terms that mystify us and befog the issue.

If there was any one thing clearly developed by our experience in the Great War, it was that the transporting of an army across the sea is an extremely practical proposition. And that for its successful prosecution we require the same kind of ships, docks, wharfs, cranes, derricks, warehouses, railroads, and other appliances that we require for similar purposes in time of peace. A soldier cannot cross the ocean in a ship made out of concrete or green lumber any better than a civilian can do it. And, when the soldier gets on the other side he cannot jump overboard and swim ashore. He has got to walk down a gangplank just the same as anybody else.

When we went to Europe, France placed at our disposal thirty different well organized harbors with docks and wharfs sufficient to berth 159 ships at the same time. This was afterwards reduced one-half. But with all of these facilities, and with all of the assistance of our allies, we were never able to discharge sufficient military stores to supply our army.

Taking the British experience of forty pounds per man per day, it was not until March of 1918 that we were able to discharge sufficient tonnage for an army of 300,000 men, and if we had had an independent army of 300,000 men, only 180,000 of them could have been in the zone of the army. The balance, 120,000, would have been required in the Service of Supply.

It was the popular belief that our greatest difficulty was ships. But, as a matter of fact, this was not true. We were slowed up and inconvenienced but never injured by German submarines. We lost but one important cargo ship, and both General Atterbury and General Dawes are on record as saying that the neck of the bottle was not in ships but in discharging the cargo at the ports and transporting it to the interior by rail. When General Harbord took command of the S. O. S. ten weeks before the armistice, he announced that his biggest job would be to speed up the unloading of ships. And such authorities as Admiral Sims, Colonel House and Marshal Petain have been quoted as saying that the American Army could never advance in the Argonne because they could not get the supplies up. Some of you may remember that at the very last five combat divisions were broken up to make S. O. S. troops.

I am a little skeptical, therefore, as to the ability of a foreign foe to land an invading army upon the open beaches of our country. When a ship starts out from Liverpool or Bremen, the usual practice in time of peace is for it to be directed upon a corresponding port in the United States. And it has got to have the same kind of a port and the same kind of port facilities in time of war. Safe refuge is absolutely necessary for an overseas expedition. If we guarantee this to our own ships, and deny it to the enemy, we win the war.

These fundamental facts, I believe, are acknowledged by all, but their significance is fully understood by few. Those charged with other missions are apt to slur over the importance of the Coast Artillery and to rivet all their attention upon the third phase of the situation, to-wit: landing operations made for the purpose of taking the harbor defenses from the rear. This may be attempted by small raiding parties—a few thousand men landed from the ships—and is a danger that our harbor defenses should be organized to prevent.

But, for an army of several divisions or corps to land anywhere except in a well organized harbor, to me is so unlikely that I prefer to let others struggle with its difficulties.

There is no perfect defense as there is no perfect offense. But a defense approaches perfection when it forces the enemy to an expenditure of men and munitions greater than he can afford. It is safe to assume that ships will not make a direct attack upon a fortified harbor, provided we first make the harbor so strong that the enemy has no chance of success. A few hundred men in a permanent seacoast fort can do this better than a division upon the beach.

Plans for beach defense are based upon the theory that our Navy has been wiped out or crippled. But, of course, the Navy is not going to be wiped out, nor is it going to be so crippled that we shall be without submarines.

It is "defendu" to bolster military opinion by citing foreign authority. But I cannot refrain from quoting an entry in the diary of Sir Ian Hamilton on May 22, 1915, when he was in the midst of his landing operations at Gallipoli. It fits our case exactly.

Our lunch was to furnish us with yet another landmark of bad luck. As we were leaving, a message came in to say that an enemy submarine had been sighted off Gaba Tepe. The fresh imprint of a tiger's paw upon the pathway gives the same sort of feel to the Indian herdsman. Tall stories from neighboring villages have been going the round for weeks, only half-believed, but here is the very mark of the beast; the horror has suddenly taken shape. He mutters the name of God, wondering what eyes may even now be watching his every movement; he wonders whose turn will come first-and when-and where. This was the sort of effect of the wireless and in a twinkling every transport round the coast was steering full steam to Imbros. In less than no time we saw a regatta of skedaddling ships. So dies the invasion of England bogey, which, from first to last, has wrought us an infinity of harm. Born and bred of mistrust of our own magnificent Navy, it has led soldiers into heresy after fallacy and fallacy after heresy until now it is the cause of my divisions here being hardly larger than brigades, whilst the men who might have filled them are "busy" guarding London! If one rumored submarine can put the fear of the Lord into British transports, how are German or any other transports going to face up to a hundred British submarines? The theory of the War Office has struggled with the theory of the Admiralty for the past five years; now there is nothing left of the War Office theory; no more than is left of a soap bubble when you strike it with a battle axe. Some other stimulus to our territorial recruiting than the fear of invasion will have to be invented in future.

With plenty of submarines, with an aggressive air force, and with all of our harbors fortified and absolutely sealed against enemy ships, the chances of an invasion from the sea must surely be very small. On the other hand, without the submarines, without the air force, and more particularly, without having all the harbors absolutely sealed up, something is liable to happen that would be very embarrassing.

The Coast Artillery problem is really a very small problem—that is, small in cost—great in value. Even if we had an army of ten million men, the Coast Artillery part of it would not exceed a hundred thousand men. But, because it is a small problem and easy of solution, all the more reason why we should not neglect it. Because the hole in the bottom of a boat can be stopped up by a cork, is no excuse for neglecting to stop it.

On the other hand, because we have the small Coast Artillery problem solved is no reason why we should neglect the great problem—our greatest problem of Natural Defense—that is the organization of our great army of citizen soldiers.

To the tax payer, national defense is a question of dollars and cents, and those of us who direct the military policy owe it to the tax payer to give him the maximum protection at the minimum cost. Harbor defense alone is not sufficient, but dollar for dollar you get more protection out of harbor defense than you can get in any other way. All the fortifications of New York harbor and Long Island Sound could be torn out and replaced by the latest and best models at less than the cost of one modern battleship. A 16-inch gun and carriage of the latest model can be manufactured and emplaced for less money than the cost of maintaining a single regiment of troops for one year.

Moreover, we should protect all of our harbors. Charleston and Mobile are just as important to the people of South Carolina and Alabama as Boston and New London are to the people of Massachusetts and Connecticut, and although the latter cities are nearer the vitals of the country, and of immensely greater strategic importance, still we cannot afford to let an enemy take even Charleston when only a few hundred men will prevent him from sailing in. During the Revolutionary and Civil Wars, Forts Moultrie and Sumter in Charleston Harbor, withstood the fiercest attacks ever made by ships upon permanent fortifications in this country. But both of these forts are now in the hands of caretakers, notwithstanding the fact that Charleston is a submarine base for the Navy and was used as a port of embarkation, both in the Spanish War and in the Great War.

Now let us take up the final phase of this matter. Assuming that we are going to seal our harbors, at what point shall we seal them? Every boy remembers Andrew Jackson's instructions to his troops in New Orleans: "Do not shoot until you see the whites of their eyes." This being the only land battle we won during the war of 1812—fought after peace was signed—the advice seems to be worthy of attention, and my opinion is that for the present, we had

better draw the dead line at 15,000 yards. That is the limit of our range finders under average conditions of visibility. Anything we can add to that will be so much gained. We have long range guns, that can fire out to forty or fifty thousand yards; but so far we have not developed any method of range finding for such great distances. We could annoy ships standing off at that range, but at present we are not prepared to say that we could destroy them.

We must remember also, that it is not a primary mission of Coast Artillery as such, to prevent the distant bombardment of cities. Such bombardment does not produce any direct result upon the military situation. The bombardment of Paris had no direct effect upon the war. When Charleston, S. C. was bombarded by the federal troops off and on for two years, the people simply moved farther uptown. And although we shudder at the thought of New York under enemy fire, yet as a matter of fact, a few hundred shells falling in the downtown district would not affect the military situation any more than a big fire or a small earthquake in time of peace.

But the capture of New York harbor would be a very different question. It is the difference between losing men in battle and losing the battle. If we could truthfully say that with six hours' notice we guarantee that no hostile ship can enter any harbor in the United States, day or night, nor stand within 15,000 yards of any seacoast battery, we would have gone a long way towards security in the matter of national defense. Such a statement, however, would be very far from true, principally because we have never been willing to accept the existing situation and make the best of it.

During the Great War we spent a billion dollars on artillery and another billion on airplanes without getting a gun or combat plane to the front, principally because we were not willing to accept existing models, but insisted upon inventing and manufacturing something better.

If we were willing to accept the existing fixed armament of the coast defenses, and the existing models and types of railroad and tractor artillery, instead of dreaming about better ones, and if we would complete our forts with all the necessary auxiliaries, such as fire control, searchlights, etc., and should provide those forts with a personnel adequate to handle them in time of peace and ready at the drop of a hat in time of war, then, and not until then could we truthfully say, "We shall hold them to the 15,000-yard line."

Our Coast Artillery should be organized on the basis of 30,000 men in time of peace and 100,000 in time of war.

And now this is where you gentlemen of the National Guard and Reserves come in. There was a time when officers of the Regular

Coast Artillery were afraid that National Guard officers would take their jobs away from them in time of war. And the National Guard felt the same way about the Regulars. But nowadays we know that if war comes there will be plenty of jobs for everybody who is qualified to handle them. If we have a big war we shall require a half million officers, of whom some 1000 would be generals and 10,000 colonels. The man will not have to seek the job, the job will seek the man. Officers trained in the Coast Artillery will be needed and badly needed for work in all other arms. If we have a serious attack upon our coast there will be plenty for all of us to do in our particular line, and if there is any other kind of a war, we shall all go out as we have done before.

The biggest thing that this country has ever done in its program for National Defense is the creation of the Officers' Reserve Corps, and with this stands the recognition of National Guard officers on the same basis. Officers who put in only part of their time on military work cannot expect to compete with professional soldiers in the technique of the military service. But technique can be learned out of books and changes with the times. On the other hand, the principles of the military art are fundamental and deep-seated in the character of the man. In your study always look for principles and work to master them, the details of technique will take care of themselves.

Now in closing, let me say this one thing: In the field the infantry is the fundamental arm. Everything else is auxiliary and supplementary to the man with the bayonet, and it is with him that the final determination of the battle rests. But in the seacoast defenses it is the big gun on the concrete base. The big gun is the thing that knocks out the battleship and every other device used in seacoast defense is auxiliary to that weapon. Pin your faith on the big gun, take as your target the broadside of a battleship, and accept as the measure of your efficiency the number of times you can hit it with one gun in one minute.

And then above all, remember that we shall get our share of gas and bombs and that we shall take our punishment and hold on.

Counter Battery

By MAJOR ROBERT ARTHUR, C. A. C.

EDITOR'S NOTE: *The following paper by an officer of wide experience as an artilleryman on the Western Front, reviews in a most concise manner the missions of Divisional, Corps, Army, and General Reserve Artillery; and considers particularly the means by which information is secured essential to the delivery of effective fire. It is well to remember that in time of war much of the Corps, Army, and General Reserve Artillery will be manned by Coast Artillery troops and commanded by Coast Artillery officers.*

IMPORTANCE

ONE of the most important duties which devolve upon artillery on the field of battle is counter battery, i.e., the employment of fire against hostile artillery in position. Superiority of artillery fire is one of the prerequisites to success in combat, for just as artillery is the main support of the offense, so is it the strongest weapon of the defense. From every aspect, then, destruction of the enemy's artillery is of primary importance, and every hostile battery forced out of action is one more step toward victory. Counter battery, therefore, cannot be neglected until the troops advance to combat. It must ever be the constant care of commanders in the field.

During the course of the World War the importance of counter battery was so accentuated that it came to be accepted as "the essential mission" of artillery.* The function of artillery, however, is more complex than this, and its missions are more numerous. The old Drill Regulations informed us: "As a general rule, the fire of artillery is directed against that arm of the enemy which at the time is predominant, or which is capable of inflicting the greatest loss on the infantry or cavalry which the artillery is supporting." Wagner says: † "The principal task of the artillery is to crush the enemy's infantry. It turns its attention to the artillery only as a means of getting rid of an obstacle to its attempt upon his infantry, or as a means of protecting its own infantry from the fire of the enemy's guns."

Both quotations indicate that counter battery is ever an essential mission which, on occasion, may become *the* essential mission of the artillery. In general, however, there are three essential artillery missions which usually occur simultaneously and which require the specific allotment of artillery to each. These are: (a) inflicting

*W. D. Doc. No. 696, 14.

†Organization and Tactics. 180.

damage to the hostile infantry, (b) inflicting damage to the hostile artillery (counter battery), and (c) inflicting damage to other hostile elements, such as communications, transportation, service of supply, information and observation services, training centers, rail-heads, depots, etc.

The relative importance of these several missions will vary with the tactical situation, and particularly will the importance of counter battery fluctuate. For example, in the early phases of a meeting engagement counter battery will be quite impracticable because of a lack of availability of suitable weapons and because of a lack of sufficient information concerning the hostile battery positions. In an attack of a prepared position, however, counter battery becomes very important; for the penetration of a defensive zone it is an absolute requirement.

COMMAND AND ORGANIZATION

As a matter of organization, artillery intended for use with armies in the field is classified as (a) *division artillery*, (b) *corps artillery*, (c) *army artillery*, and (d) *general headquarters reserve artillery*. Each of these is separate and distinct from the others. There is no direct chain of artillery command between the army and its divisions. Command of the artillery is exercised by the commander of the unit of which it is an organic part or to which it is attached, and control by higher authority is exercised only through the normal chain of command.

The *division*, relatively mobile and moving frequently, is the unit which engages in close contact with the enemy and which requires intimate support by the artillery. To it, therefore, is assigned light artillery—mobile, capable of firing rapidly, and able to shift quickly from target to target or from position to position.

The *corps*, less mobile than the division, moves less frequently. It usually has the time and the facilities to become familiar with the organization and disposition of the enemy and with the terrain occupied by his combat forces. To it, therefore, is assigned less mobile but more powerful artillery of medium caliber.

The *army*, relatively immobile, has the time and facilities to learn the hostile dispositions to a much greater depth than is permitted to the corps. It must be prepared to undertake any artillery mission for which the artillery of the divisions and the corps may prove inadequate in number, in power, or in character of weapons. However, until the theater of operations is determined and the tactical situations begin to develop, the character of the special missions which will fall to the artillery and for which the corps and division

artillery may be inadequate cannot be foretold. Consequently, to avoid encumbering the army with artillery which may not be required, the army artillery organization organically contains no artillery, other than a brigade of antiaircraft artillery. Suitable artillery units are secured from the General Headquarters Reserve as soon as the necessity for their use can be determined. These units are then retained by the army as army artillery or are reallocated to the corps, or even to the divisions if the pieces be small. In case of such reallocation, these artillery units become, for the time being, a part of the corps or the division artillery.

The *general headquarters reserve artillery*, as such, has no tactical functions. It exists solely to provide artillery units for the special missions of the several armies and therefore, in order that no call for artillery may remain unfilled, it contains weapons of all types and all calibers.

Thus we find on the field of combat three separate artillery organizations, each equipped with weapons preeminently suited to one of the three primary missions of artillery. While the division artillery is engaged in the close support of the infantry and the corps artillery is occupied in subduing the hostile artillery, the army artillery remains available for long-range firing and for special missions of any sort.

ARTILLERY NORMAL ZONES

For the purpose of assuring adequate artillery treatment of the area occupied by the enemy, artillery units have assigned to them by the next higher authority areas known as normal zones of artillery action. These zones usually coincide laterally with the zones of action of the units to which the artillery belongs, and extend to a depth which is determined largely by the character of the several artillery units.

The artillery normal zone of the division extends into the enemy position to a depth of about 4000 yards from the front lines, which depth may be increased to about 5000 yards if 155-mm. howitzers be attached to the division. This depth is sufficient to permit the division artillery to deliver adequate fire upon any infantry formations which threaten immediate influence upon front line action. Within this area the division artillery is responsible for all ordinary fire action, other than counter battery.

For the corps, the artillery normal zone extends into the enemy position to a depth of about 10,000 yards from the front lines. Within this zone will be found the greater part of the hostile artillery formations, and its extent is not so great as ordinarily to tax

the ability of the corps to undertake counter battery operations in any part of the area. When there is no army artillery present, the corps artillery normal zone is, naturally, extended to the limit of effective range of the available weapons. Within its normal zone, the corps artillery is responsible for all ordinary fire action beyond the limits of the division artillery normal zones, and for all counter battery within those zones.

The army artillery normal zone extends in depth from the outer boundary of the corps artillery normal zones to the front as far as the ranges of the available weapons will permit. Within this area, the army artillery is responsible for all fire action.

Eventual or contingent zones may be, and usually are, assigned to the several artillery units. In particular, hostile artillery firing into a corps zone of action from a flank may be assigned to the corps artillery, and any area not included within corps and division normal zones (as in the case of two corps operating on divergent lines) may be assigned to the army artillery or be divided between the army and corps concerned. All corps and division artillery normal zones within the army zone of action are army artillery contingent zones.

Since hostile artillery may be found in any of these zones, all artillery must be competent to give effective counter battery service. In particular must the army artillery be prepared for counter battery against long-range artillery which may be located at a distance exceeding 10,000 yards from the front lines.

While the division artillery must be prepared for counter battery action, its preparation is only provisional. The corps may require the division artillery to assist in counter battery work, but the multiplicity of more appropriate demands made upon it during the course of an engagement makes it expedient to reduce to a minimum the employment of division artillery on counter battery missions.

Counter battery thus becomes primarily the function of the corps artillery, assisted by the army artillery and, on occasion, by the division artillery.

COUNTER BATTERY COORDINATION AND CONTROL

The Army Chief of Artillery is a staff officer on the army staff, and is also the commander of the army artillery, control of the army artillery being exercised by the army commander directly through his Chief of Artillery.

On the staff of the Army Chief of Artillery is a colonel who is the head of the Intelligence Section of the artillery staff. This Section is divided into two sub-sections: the Artillery Information Service, with one lieutenant colonel, one major, two captains, and

two first lieutenants, and the Counter Battery Service, with one lieutenant colonel, one major, and two captains.

With the assistance of his staff, the Army Chief of Artillery is responsible for the coordination of all artillery activity within the army, both in offense and in defense, and he should pay particular attention to counter battery. Exclusive of his other functions, the counter battery duties of the Army Chief of Artillery involve:

- (a) Command of all units of the army artillery not placed at the disposal of corps or divisions.
- (b) Control of the Artillery Information Service (Intelligence Section).
- (c) Control of sound ranging service (Intelligence Section).
- (d) Supervision of the army artillery observation system (Plans and Training Section).
- (e) Cooperation with the artillery of adjacent armies (Plans and Training Section).
- (f) Tactical control and apportionment of air service units attached to the army artillery (Plans and Training Section).
- (g) Preparation of plans for counter battery action (Counter Battery Officer in cooperation with Plans and Training Section).

Maintaining close contact with the Army General Staff and considering the character and amount of artillery available and the grouping of the hostile artillery, the Army Chief of Artillery prepares and submits to the army commander his plans as to the extent of counter battery areas. He provides for fire on targets lying without the several corps zones or beyond the range of the corps artillery. He insures adequate dealing with hostile batteries situated in the zone of one corps but firing upon the front of another, for it seldom happens that all the opposing artillery which fires upon any particular corps will be located entirely within the zone of action of that corps. He deals directly with the air service commanders in all matters relating to the combined action of the artillery and the Air Service; and he maintains close touch with G-2 of the army and with the Artillery Information Service in all matters affecting artillery intelligence.

The Corps Chief of Artillery is a staff officer on the corps staff, and is also the commander of the corps artillery, which consists of the corps artillery brigade, an ammunition train, an observation (flash) battalion, a regiment of antiaircraft artillery, and such attached units as may be allotted by the army to the corps. It should be noted that he is not the commander of the corps artillery brigade, his control being exercised through the brigade commander.

The Intelligence Section of the staff of the Corps Chief of Artillery includes one lieutenant colonel or major and two captains. The field officer is the Intelligence Officer and head of the Section, while one captain would ordinarily be charged with the details of the intelligence service and the other with the details of counter battery service.

The Corps Chief of Artillery is responsible for the coordination of all artillery activity within the corps, and, since counter battery is the primary mission of corps artillery, he should be very particular concerning the adequacy and efficiency of the corps counter battery service. In general, his counter battery duties are similar to those of the Chief of Army Artillery, with particular attention to the collection and dissemination of artillery intelligence. Through his counter battery officer he prepares daily reports of enemy batteries in action, periodic reports of artillery activity, summaries of information covering location of hostile batteries, records of usual enemy targets, records of each identified enemy battery, effect of hostile fire, effect of own fire, etc., and maps showing enemy battery positions known or suspected to be occupied and own battery positions showing ranges, fields of fire, dead spaces, etc.

The Corps Artillery Brigade Commander is a tactical commander, and not a staff officer. He serves directly under the command of the Corps Chief of Artillery, and has a staff identical with that of the Division Artillery Brigade Commander, save in one respect. Since the corps artillery brigade is concerned particularly with counter battery, there is added to the brigade staff one first lieutenant who is the brigade counter battery officer.

Concerned mainly with the tactical command of the brigade of corps artillery, the brigade commander is limited in his counter battery duties largely to the collection of artillery intelligence and to the execution of counter battery missions assigned him by the Corps Chief of Artillery. Efficient execution of these missions requires that he be at all times in possession of all possible information concerning the enemy artillery. Moreover, he must not fail to take advantage of any unexpected situation which may afford an opportunity to inflict damage to the hostile artillery. To this end he must make full use of all agencies (such as the flash ranging service) within his command so that he may be promptly and fully informed of all situations as they develop.

The Division Chief of Artillery is a staff officer on the division staff, and is also the commander of the division artillery. He is, in general, not concerned with counter battery and is therefore not provided with a counter battery officer on his staff. Never-

theless, he must be prepared to use his artillery for counter battery purposes, and must be familiar with the counter battery organization and provided with the necessary counter battery information. When necessary, his Intelligence Officer serves as counter battery officer.

When the situation is more or less stabilized, counter battery is conducted deliberately and systematically. All organizations collect information of the enemy from all available sources and forward it to the next higher authority. Here all intelligence received is assembled, studied and coordinated, and sent both to higher and lower authorities. Thus the corps counter battery officer comes into possession of all artillery information obtained within the army. With this at hand, he can prepare daily programs of counter battery operations for assignment to corps artillery and, if desired, to division artillery. These programs must be sufficiently general in character to permit some latitude in application and to permit counter battery on pieces coming into action but not included in the program.

The corps artillery brigade counter battery officer prepares a detailed schedule from the corps general program, and determines the artillery required to carry out the program, the method of fire (concentration on successive positions, simultaneous engagement of all positions, or some combination), the rates of fire, the amount and character of ammunition to be used, etc. He also makes arrangements to engage any battery which may be reported in action within the corps artillery normal zone but not included in the counter battery program.

When an attack is in progress or about to be made by either side, time is lacking to prepare detailed plans. In this case, the Corps Chief of Artillery can only indicate the general scheme of counter battery action, and the brigade must secure its own information and prepare its own plan. With its flash observation battalion, ground observation service, air service assistance, and reports from other units, it locates the hostile batteries as accurately as possible and orders the necessary counter battery.

The dividing lines between organizations, whatever their size, must always be regarded as elastic, and arrangements must be made by the commanders concerned for adequate overlap on either flank by the assignment of eventual missions.

Whatever may be the details of organization for counter battery service, its whole object is to insure a methodical, thorough and efficient system of counter battery work, which in actual battle plays

a capital role. Accurate information, rapid communication, a sufficiency of suitable artillery, good observation, and an adequate plan are all essential.

INFORMATION

The efficiency of the counter battery service depends largely upon the efficiency of the Artillery Information Service. This service is a sub-section of the Intelligence Section of the staff of each artillery commander. The information it seeks in preparation for counter battery is: (a) location and character of hostile emplacements, and whether occupied or not; (b) calibers and types of hostile guns; (c) general direction of hostile fire and usual targets; (d) location of hostile observation stations; (e) hostile fire control systems; (f) enemy artillery activity; dates, number of rounds fired, targets, kind of ammunition used, effect of fire, etc.; (g) descriptions of the hostile counter battery service; (h) amount, kind and results of own fire against hostile artillery.

The information concerning the hostile artillery is obtained from the following sources: (a) airplane observation; (b) balloons; (c) sound ranging stations; (d) flash ranging stations; (e) air photographs; (f) terrestrial observation; (g) intelligence from other arms and branches of the service; (h) other sources, such as reports of prisoners, captured documents, intercepted messages, etc.

Airplane observation for the location of batteries ordinarily is not sufficiently accurate to be of value for counter battery operations. Approximate locations, however, may be determined by aerial observers.

Balloons can furnish a great part of the information concerning hostile batteries in action, provided that visibility be good and that ample protection be furnished by antiaircraft artillery and airplanes. Their great distance from the objectives and their vulnerability are distinct handicaps to their use.

The development of sound ranging greatly facilitates the work of recording hostile batteries, as by this means the location of a battery can be accurately determined during a period of definite activity. With four or more observations on the same gun, its location can be determined to within less than fifty yards; the time required should not exceed five minutes after the last observation; and, if conditions are reasonably favorable, the type and caliber of the gun may be determined. It is possible also to determine the target fired upon, and consequently, by the collation of a number of sound ranging reports, the arcs of fire of hostile batteries may be determined. By comparing sound ranging reports with those of the

visual services, any system of dummy flashes should, sooner or later, be discovered. The service, however, operates under a handicap during a continuous bombardment by our own artillery or whenever the total rate of fire of the enemy exceeds about one round per second.

Sound ranging sections do not constitute an organic part of an army or smaller unit, but may be attached to the army from the General Headquarters reserve artillery when conditions warrant. A unit requires about two days for its installation and cannot, therefore, be used in situations where the front changes rapidly.

Flash ranging sections have a greater value in non-stabilized situations than do sound ranging sections because of their greater mobility and, to a certain extent, because of the more exposed location of hostile artillery in such situations. By intersections on the flashes of the guns of the enemy battery locations are accurately determined. A unit can be installed in about half a day. Each corps artillery brigade includes one observation (flash) battalion.

Air photographs furnish the most certain means of positively identifying the locations of hostile batteries, but in non-stabilized situations they are frequently received too late to be of use. In the more stationary situations, however, they are of incontestable value, and are essential if all the hostile artillery is to be located. The service becomes unreliable in foggy or rainy weather.

The appearance of flashes or the absence of flashes from a located gun position do not necessarily indicate that a position is or is not occupied. However, careful consideration of photographs of various dates will greatly assist decision as to whether positions are occupied or not, and will also disclose the positions of emplacements being constructed for the support of the enemy's rearward lines of defense, thereby enabling a commander to prepare in advance his plans for counter battery work in the future. Finally, air photographs will assist a commander to appreciate the results of his own counter battery work. Constant photography is therefore required for the location of new battery positions, surveillance of positions previously determined, and determination of the efficacy of our own fire.

Terrestrial observation is the basic method of observation, but it cannot invariably be counted upon. Being simpler and more direct than the other methods, it is, whenever practicable, preferable to the others and will ordinarily be used. In general, however, the greater the distance to the hostile positions, the more dependence must be placed on other than terrestrial observation.

COMMUNICATION

The system of communications for counter battery service must be carefully studied if efficiency is to be insured and waste of material avoided. Counter battery formations should, as far as material may permit, be in direct communication with similar formations on either flank, with the air service, with the observation posts, with the flash and sound ranging services, with the Artillery Information Service, with the artillery of other organizations, and with their own command posts. Without such communication, rapid transmission of information and of orders is impossible, and so, consequently, is the rapid delivery of effective fire.

ALLOTMENT OF ARTILLERY

As in other missions, guns and howitzers of any caliber may be employed in counter battery, according to the requirements of the tactical situation which alone can indicate the nature and volume of artillery fire to be devoted to each phase of artillery action. Howitzers ordinarily have been preferred to guns for counter battery because of their greater angles of fall and larger bursting charges, but the increased elevations permitted by recent modification of carriages make guns almost equally valuable. In general, if there be overhead cover, the class of artillery to be used should be that which will give the greatest probability of securing penetrating hits, dispersion and angle of fall both being considered; if there be no overhead cover, the class of artillery to be used should be that which will give the maximum destructive or neutralizing effect, dispersion and size of bursting charge both being considered.

Howitzers of 8-inch or larger calibers are required for work of destruction of well-protected batteries; guns play their part in neutralization or in destruction at the longer ranges. Howitzers of 155-mm. caliber are largely used for neutralization and are particularly effective. They are scarcely powerful enough to destroy long-established and carefully constructed emplacements, but they are of great value in an advance when the enemy guns have been forced back into positions more or less hastily prepared.

Light guns, with their rapid rate of fire, can be of great assistance in neutralizing the nearer unprotected hostile batteries. Their value in this respect is perhaps likely to be overlooked, owing chiefly to the fact that there are so many more appropriate uses for them in the actual battle.

In theory, the guns to be allotted to counter battery operations should be suited to the character and locations of the target batteries; in practice, choice will be limited by the amount and character of artillery available, and the principal counter battery weapons will be the 155-mm. cannon of the corps artillery.

OBSERVATION

In the World War a greater proportion of unobserved effective fire was delivered than in any previous war. It is, however, quite evident that, other things being equal, the efficiency of artillery fire will be directly proportional to the accuracy and continuity of the observation of fire. Accurate observation is necessary for destructive fire unless an extraordinary amount of ammunition is to be expended, and observation must be continuous if the maximum effect is to be secured.

The assistance in counter battery fire than can be and is afforded by the air service is beyond dispute, but careful coordination is required. The closest personal contact must be maintained between the artillery and the air service as a matter of first importance. Difficulties and occasional failures will occur, but their recurrence can best be obviated by frequent interviews, both before and after action, between the officers of the two services concerned.

At the same time, the artillery must not look upon the airplane as essential to effective fire, particularly as regards neutralization. Correct calibration, use of datum points, complete and accurate information concerning hostile batteries, and scientific preparation of firing data (topographic, ballistic and meteorological) will render it perfectly possible to deliver an effective fire on occasions when the airplane cannot operate or is not available. On such occasions, recourse may be had to instrumental observation from two ground stations, for which purpose it will be sufficient if the bursts of the projectiles can be seen, provided the coordinates of the hostile battery have been accurately determined. Ground observation, being generally preferable to all others, will ordinarily be used by artillery whenever conditions permit.

All means of observation of fire (airplane, balloon and terrestrial, and even sound and flash ranging) should be coordinated and employed. The increasing ranges of artillery weapons and the use of defilade usually makes it impossible to secure direct observation from the ground. On the other hand, the difficulty of securing and maintaining control of the air makes air observation unreliable. In general, however, if destruction of enemy artillery is to be attempted, aerial observation will be the only practicable method available.

PRINCIPLES OF ACTION

Counter battery may be accomplished by either of two methods: (a) Destruction, or (b) Neutralization. It is obvious that destruction offers the most satisfactory method of reducing to impotence the enemy artillery, but, since this ideal can never be completely achieved, occasions will arise in any active operation when the infantry must be further protected from the hostile guns by fire for neutralization.

It is the duty of army and corps commanders to prescribe, from time to time, the amount of artillery to be devoted to counter battery work. While specific batteries must be detailed for normal counter battery operations falling within the scope of the army or the corps programs, it is evident that the actual number of guns required must and will vary with the tactical situation. Unless the counter battery program for the day specifies the particular batteries to be employed and aims at avoiding unnecessary changes, cooperation on the part of the air service will be made far more difficult and the great advantage accruing from personal understanding between artillery and air service officers will be largely lost.

The immediate object of all counter battery action being to secure a maximum effect on hostile artillery, batteries detailed to this work should, in principle, be placed well forward, so that distant hostile batteries may be reached and that full benefit may be derived from enfilade fire.

DESTRUCTION

Destruction of hostile artillery is one of the guarantees of success and should be sought whenever time and means are available. It involves careful adjustment on each target, the expenditure of a great deal of ammunition, and continuous observation or frequent verification of the fire for effect. It is a continuous operation and is carried out both before and after combat. During an engagement counter battery operations usually will be limited to fire for neutralization.

To insure destruction of a battery, certain requirements must be met: (a) The battery position must be accurately located; (b) it must be established that the position is actually occupied; (c) fire must be carefully controlled throughout the fire for effect; (d) a sufficient quantity of ammunition must be devoted to the task.

It is futile to attempt the destruction of a hostile battery with a limited number of rounds. A considerable number of hits will be required, depending upon the caliber of the firing battery, the cali-

ber of the target battery, and the protection of the targets. The percentage of hits to be expected will vary with the probable error of the gun firing, the area of the target, the excellence of gunnery, and the accuracy of observation.

It is manifestly impossible to specify the exact number of rounds which will be required in any given case, but the following tables* may be used as a rough approximation. The table assumes that all fire is observed, that the probable error does not exceed fifty yards, that the targets for the 155-mm., 6-inch and 8-inch guns are provided with all protection possible other than concrete overhead cover, and that the targets for the 8-inch howitzer and larger calibers are provided with concrete overhead cover.

Average Ammunition Expenditure to Destroy an Enemy Battery

<i>Firing Battery</i>	<i>Rounds (according to range)</i>
75-mm. gun	500 to 800
6-inch gun	400 to 600
155-mm. gun	400 to 600
155-mm. howitzer	300 to 400
8-inch gun	300 to 400
8-inch howitzer	250 to 350
9.2-inch howitzer	200 to 350
240-mm. howitzer	200 to 300
10-inch gun	200 to 300
12-inch gun	150 to 250
12-inch mortar	100
14-inch gun	100

When using the larger calibers, the above amounts may be reduced by about one-half for batteries in the open and by about one-quarter for those well dug in but not provided with strong overhead cover. If reasonably efficient observation cannot be secured the above amounts will have to be at least doubled. There can be no certainty, no matter what the expenditure of ammunition, that unobserved fire will destroy a target.

Economy in ammunition is to be sought, not in withholding any of the amount required for a legitimate task, but by taking every precaution to insure accuracy of fire and by avoiding the possibility of waste through engaging doubtful targets or adopting a policy of half measures. If destruction is to be achieved with any degree of certainty, fire should not cease until the mission, so far as can be ascertained, has been accomplished, and observation should continue to the last in order that any developed inaccuracy of fire may at once be detected and corrected.

Time is a factor of great importance in destructive work so far as regards the cooperation of the air service, and every step taken to expedite fire observed from the air is an emphatic gain.

*G. S. S. Tactics and Technic—Artillery, II 48.

In carrying out the work of destruction, every endeavor should be made to exploit the use of oblique and enfilade fire, since in every case the lateral dispersion of a gun or howitzer is much smaller than its longitudinal dispersion, and the probability of obtaining direct hits therefore increases with the obliquity of the line of fire to the target.

Known batteries must be definitely selected for attack, and the daily program of counter battery work should indicate their relative importance or specify the sequence of attack. Prearranged programs of fire should be conducted as systematically as possible so as to admit of a maximum of aerial observation of fire.

Consideration must always be given to the selection of the most suitable weapon for each case of destructive fire. It is obvious that heavy howitzers will be required to attack batteries protected by strong overhead cover, while light howitzers will be adequate against the same batteries unprotected. Commanders should also bear in mind that in case of open warfare or in case of a sudden shift in the lines of contact of a well-prepared position or a defensive zone, there will be periods during which many hostile batteries will be little or not at all protected. Under such circumstances, full use can be made of the lighter forms of artillery.

Shrapnel fire from field guns sometimes can be employed usefully in conjunction with the actual work of destruction with a view to causing loss to personnel compelled to withdraw from the guns or attempting to remove the hostile battery.

NEUTRALIZATION

In practice, counter battery conducted with a view to complete destruction is never successful except for small areas. The enemy does not always reveal all his battery positions until the attack begins; he changes the positions of batteries after firing; conditions frequently prevent observation; destruction considered complete is in fact often incomplete. Because of such conditions counter battery during combat usually is limited to fire for neutralization.

The object of neutralization is to prohibit all hostile artillery fire within the area attacked by subjecting the entire area to a sufficiently intensive fire. All batteries within the area are neutralized simultaneously, so fire should be distributed over the whole target from the first round.

In an attack or in a defense, the infantry must be relieved as far as possible from the burden of enemy artillery fire. Every available weapon must be employed against the enemy artillery and be continued in action until the infantry is established in the position won

or until the enemy attack is definitely repulsed. On every hostile battery position, known or suspected to be occupied, fire of an intensity sufficient to prevent the service of the pieces must be opened and continued. Neutralization zones must be allotted to combat units down to include the battery, and, in considering plans to meet attack or counter-attack, the counter battery program must include a plan of general neutralization to be executed, if necessary, by every weapon that can be spared for the purpose.

It is questionable whether an attempt should be made to destroy hostile batteries definitely located just before an attack. Every battery that is destroyed is, of course, one less to consider on the day of attack. On the other hand, batteries that are not actually destroyed may move to another position and so be unlocated when the attack begins. In this case it may be impossible to destroy or even to neutralize them. These considerations must receive due weight in the artillery preparations for an offensive operation.

Neutralization requires a large expenditure of ammunition, but only for the few hours of the actual progress of the combat, and the ammunition required for these few hours will usually be less than that required for destruction. Gas, shell, shrapnel or smoke, or combinations of these may be used. Gas is the most economical projectile, but a proportion of shell appears to be necessary when gas is employed.

TABLE OF NUMBER OF ROUNDS REQUIRED PER MINUTE TO NEUTRALIZE
5000 SQUARE YARDS OF SURFACE

	Average weight of projectile	Average maximum weight of bursting charge	Relative Efficiency	HE or non-persistent gas rounds to be fired per time-area unit
	lbs.	lbs.	Pct.	
2.95-inch Mountain Gun	12.5	0.5	3.5	36
75-mm. Gun	11.8	1.6	13.6	10
4.7-inch Gun	45	6	13.3	3
155-mm. Gun	95	17	17.9	1
155-mm. Howitzer	95	16	16.8	1
8-inch Gun	200	29	14.5	0.5
8-inch Howitzer	200	29	14.5	0.5
9.2-inch Howitzer	290	33	11.4	0.5
240-mm. Howitzer	356	40	11.2	0.33
12-inch Gun	700	90	12.9	0.17
12-inch Mortar	700	94	18.4	0.17

The approximate amount of artillery fire required for temporary neutralization of positions not provided with overhead cover is taken as one round of 155-mm. non-persistent gas or high explosive per minute for each 5000 square yards of area. After the first hour, this rate can be reduced 25 per cent. While data are limited, the foregoing table* indicates the approximate amount of fire re-

*G. S. S., Tactics and Technique—Artillery, II, 117.

quired for the same time-area unit, the number of rounds being determined roughly by the amount of explosive required.

If mustard gas shell is used, the above figures can be reduced 75 per cent after the first hour, employing thereafter five per cent of mustard gas and 20 per cent of high explosive. If persistent tear gas shell is used, the figures shown can be reduced to five per cent for small targets or two per cent for large targets together with 25 per cent of high explosive. Persistent gas should not be used on areas over which the infantry is to pass during an attack.*

Artillery of all calibers to include 9.2-inch and 240-mm. howitzers may be provided with the following gases, most of which were common to the American, British, French, and German artilleries:

I. Non-persistent (10 minutes to 3 hours):

(a) Phosgene, an extremely deadly lung irritant; the principal surprise gas; not economical as a neutralizing gas, but may be so used when required because of non-persistency.

(b) Diphenylchlorarsine, a sneezing gas; causes coughing, sneezing, vomiting, and violent pains in the head, throat and chest; a very economical non-persistent neutralizing gas.

II. Moderately persistent (3 hours to 12 hours):

(a) Chlorpicrin, a deadly tear gas and lung irritant.

(b) Chlorpicrin 80 per cent, stannic chloride 20 per cent; combines the effect of chlorpicrin with those of stannic chloride, a toxic dust producer which tends to penetrate the mask.

(c) Bromacetone, a moderately deadly tear gas.

III. Persistent (3 days to 7 days or more):

(a) Mustard gas, a deadly respiratory irritant and vesicant; the principal neutralizing gas where casualties or complete evacuation of areas are desired; not usually used as a surprise gas.

(b) Brombenzylcyanide, the most powerful tear gas; the most economical neutralizing gas.

IV. Smoke:

(a) White phosphorus; (b) Titanium tetrachloride.

From the foregoing table it will be noted that the 155-mm. gun is the most economical gun to use for neutralizing purposes, having the greatest weight of shell filler to weight of projectile. This, with its great range, causes it to be the principal gun used for neutralizing fires at ranges exceeding 10,000 yards. For lesser ranges the 155-mm. howitzer is nearly as effective, but it is not always available for neutralization as its objectives frequently require destructive fires rather than neutralizing fires.

A thorough and detailed plan is essential to effective neutralization, and such a plan can be built up only on knowledge. Hostile batteries will not be neutralized unless their whole history is studied

*In connection with the employment of gas shell, attention is invited to the adoption by the Washington Conference on the Limitation of Armament, 1922, of treaty provisions prohibiting the use in war of "asphyxiating, poisonous, or other gases," as between signatory powers. The present Tables of Organization do not contemplate the inclusion of gas shell among the ammunition to be carried by troops in the field, but the fact that not all nations are signatories makes it desirable to keep in mind the possibility of the use of gas.

from day to day with untiring energy. Further, to increase the probability of success, the fire of neutralization should be observed, whenever possible, both from the air and from the ground.

Neutralization should not be entirely discontinued at the conclusion of an engagement if the opposing forces remain in contact. The morale of a hostile battery may be considerably affected by the knowledge that it will be subjected to prompt and accurate neutralization whenever it opens fire. It is therefore important that hostile batteries be quickly engaged, not only when their flashes are directly observed, but also when their activity is deduced from current reports. Such deductions will frequently prove correct if a quick and reliable system of transmitting information of hostile artillery activity exists.

RECORDS

A methodical system of sifting, recording, and studying all information concerning hostile artillery, from whatever source received, is essential to the quick and effective application of counter battery fire. All information of immediate importance must be forwarded direct to artillery headquarters, while the coordinate positions of all available details should be published periodically by the army in the form of a map or a list or both. This map or list forms the basis of the counter battery programs ordered by the army and the corps.

In every counter battery office, there is kept a book or a card index in which the record of every known battery within the allotted area is entered from day to day until the battery is struck out as having been destroyed or moved to a new position. Air photographs of each position should be filed with the record. A hostile battery's record should include its caliber and type, coordinate position, amount and nature of protection, sector and periods of activity, usual targets and accuracy of fire, occasions on which it was fired upon and weapons used, amount of ammunition expended, damage, and other pertinent data.

By this means it is possible to compile a list showing at a glance the positions and natures of hostile batteries that are known to fire on the various sectors of our lines, and constant reference to this list and to the batteries' records will not only enable counter battery fire to be directed from day to day on well reasoned lines but will build up a store of valuable knowledge for use in battle.

If complete and accurate records are available in the counter battery office, the hostile batteries may be effectively neutralized by the employment of one-half as many guns as the number of guns to

be fired upon, unless, of course, the hostile weapons are very widely distributed. If the interval between guns exceeds about 50 yards, the number of counter battery guns required may have to be increased to the number of target guns.

The Intelligence Section of the corps staff prepares and distributes a daily report of enemy batteries in action, and a bi-weekly report covering thoroughly all artillery activity for the period and comparing it with the previous period. It prepares and distributes maps showing all known or suspected hostile battery positions and such other data as may be pertinent. Through the counter battery officer it prepares and keeps up to date plans for counter battery, basing the plans upon the materiel available for use, the types and dispositions of the enemy materiel, and the amount and kinds of ammunition available for counter battery.

PLANS AND ORDERS

Proposals for the use of the artillery, prepared for a unit commander by his Chief of Artillery, are developed as a part of the general plan for the use of the unit and must be coordinated with the proposed employment of the other arms. When accepted by the unit commander, the proposals are incorporated in his order for the employment of the unit.

The preparation of an artillery project requires both time and study, and it should be worked out well in advance. Particularly is this true of the counter battery plan. Even where the project can be only tentative, based on probable or possible operations, it should nevertheless be prepared and thereafter kept up to date. By this method alone will the artillery commander be able to fulfill his counter battery duties when occasions for counter battery arise.

In general, the details which must be included in an artillery project are too voluminous to be included in the artillery sub-paragraph of the army or the corps field order, so it is usually prepared separately and attached to the field order as an annex thereto. In stabilized situations, counter battery programs will be issued daily, or at least with much greater frequency than unit field orders. They then merely constitute a serial annex to the field order accounting for the situation, and they are always a part of the unit plan of operations and are issued by the unit commander.

The counter battery plan must always be a complete, thoroughly prepared, methodical program, worked out in full accord with the plan of operations for the unit to which the artillery belongs, and kept corrected in the light of current information. The program should place fire upon all known hostile batteries by the use

of designated combat units at a specified rate and a specified amount of fire. It should also provide for engaging other batteries discovered during the execution of the counter battery program.

DEFENSE

The principal missions of corps artillery in defending a position are, first, destruction of the hostile infantry, and second, counter battery. As the defensive ordinarily presupposes an inferiority of force it must be expected that the attack will have superior strength in artillery, a large part of which will normally be engaged in counter battery. Therefore, if the artillery of the defense is to accomplish its first mission, it must so emplace, so employ and so maneuver its batteries as to keep the enemy in ignorance of their locations, or they must be so disposed as to reduce the efficiency of hostile fire. For this, certain requirements must be met:

- (a) By pursuit airplanes and by antiaircraft artillery the enemy must be denied the use of the air.
- (b) All artifice must be employed to conceal battery positions from hostile observation.
- (c) Alternate battery positions must be prepared and used. So far as practicable, the position occupied when the attack opens should be one which had not previously been used.
- (d) A maximum of protection must be provided for the batteries and their personnel.
- (e) Guns should be so widely dispersed that two or more guns cannot be silenced by the fire of one gun of the attack. About fifty to a hundred yards between guns would seem to suffice.
- (f) Finally, service of the piece must persist as long as possible, despite the hostile fire.

CONCLUSION

Counter battery is not a matter of spasmodic effort, but is a continuous operation, depending for success upon accuracy of fire, continuity of plan, unremitting study, and firm control. Only by its conduct on these lines will it meet the end in view, namely, the considerable if not total reduction of the volume of hostile artillery fire, whatever the character of that fire may be.*

*This article is based upon a lecture prepared by the writer while an instructor at the Heavy Artillery School, A. E. F. American, British and French publications then current were consulted, but no record was retained of material obtained from those sources and due acknowledgement cannot now be made. In the preparation of the present article the General Service Schools publication, *Tactics and Technique—Artillery* (2 vol.), has been freely consulted and a number of paragraphs taken therefrom more or less bodily.

Notes on the Dardanelles Campaign of 1915

By MAJOR SHERMAN MILES, G. S.

EDITOR'S NOTE: *This is the third installment of this article. The fourth and last installment will appear in the March JOURNAL.*

THE TURKISH DEFENSE

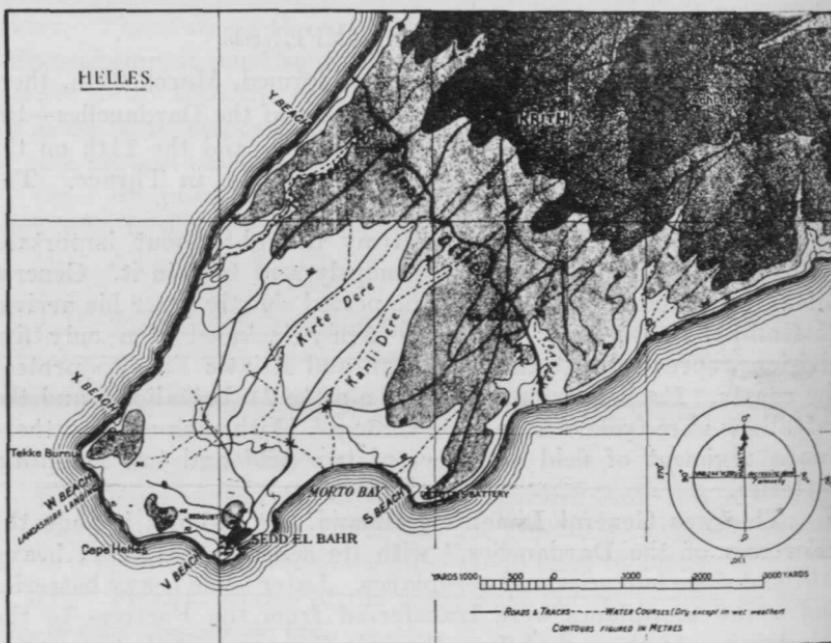
WHEN the 5th Turkish Army was formed, March 24th, there were but four divisions on the shores of the Dardanelles—the 7th, 9th and 19th on the Gallipoli Peninsula, and the 11th on the Asiatic side. The 5th Division lay at Kershan, in Thrace. The 3rd Division was still in Constantinople.

The formation of the 5th Army brought about important changes. The 5th Division was promptly sent to join it. General Liman von Sanders, speaking of the period shortly after his arrival at Gallipoli, says that: "The 5th Army included then only five divisions, spread about the European and Asiatic sides to protect the coasts. Each division had from nine to 12 battalions, and the battalions were from 800 to 1000 strong." With each division there was a regiment of field artillery, of two field and two mountain batteries.

This was General Liman's command. It did not include the "Fortress of the Dardanelles," with its seacoast batteries, heavy field and siege batteries and aeroplanes. Later some heavy batteries and a few aeroplanes were transferred from the Fortress to the 5th Army. At the end of June the only German unit that served in the campaign—a company of Engineers—reached the Peninsula.

The Turkish General Staff criticizes rather severely the disposition of the Turkish forces at the beginning of the operations. In one of their reports on the campaign they point out that behind the all-important sector of the Dardanelles were no less than 10 divisions, not including either the 3rd or the 5th. There were two divisions in Thrace, at Kirk Kilisse and Adrianople, 100 to 120 miles from Gallipoli, two on the Panderma-Balikesri railroad, 75 miles east of the Dardanelles, and six in the neighborhood of Constantinople. Considering the improbability of a Russian attack on the Bosphorus or a Bulgarian attack on Adrianople, they think that at least four more divisions (in addition to the 3rd and 5th) should have been sent to the Dardanelles before the Allies landed. "The great military and political importance of the Dardanelles had not been realized," concludes this report.

"The English left me four good weeks' respite," says General Liman, ". . . just sufficient to take the most indispensable measures and to bring down the 3rd Division from Constantinople." Not only did the Allies give him a respite, but warning after warning. As early as the last week in February the Paris papers had speculated on an expeditionary force to assist the Allied Fleet in its attack on the Dardanelles. The naval operations and the first concentration of troops at Lemnos were followed by the reorganization in Egypt, during which the Egyptian press published "numerous and



repeated references to the expedition and to its destination." Finally a telegram from Vienna was forwarded to General Liman revealing very accurately the closely guarded secret of the landing date.

On the 1st of April General Liman inspected the south end of the Peninsula. He found the Turkish troops "distributed along the coasts, rather like detachments of frontier guards in the good old times. Everywhere a debarking enemy would have encountered a certain resistance, but the absence of reserves would not have permitted us to sustain a powerful and energetic shock. I ordered each division to concentrate its forces and to leave on its sector of the coast only absolutely indispensable outposts. Whatever might happen, the only chance of final success lay in the mobility of our three groups, and not in the employment of our feeble effectives in a

rigid defense." With this end in view, he tried to give flexibility to his troops by marches and maneuvers and by constructing roads. He also materially changed the strategic distribution of his forces.

He posted an independent cavalry brigade north of the Gulf of Saros; the 5th Division at the head of that Gulf; the 7th in the Bulair-Gallipoli-Bergaz area, with a gendarme battalion on its left watching the coast as far as Ejelmar Bay; the 9th Division in the Gaba Tepe-Maidos-Helles area; the 3rd on the Asiatic side south from Kum Kale, and the 11th still farther to the south, opposite Besika Bay. The 19th Division, newly formed, constituted the army reserve at the waist of the Peninsula, south of Boghali, with a battalion watching the coast between Ari Burnu and Suvla.*



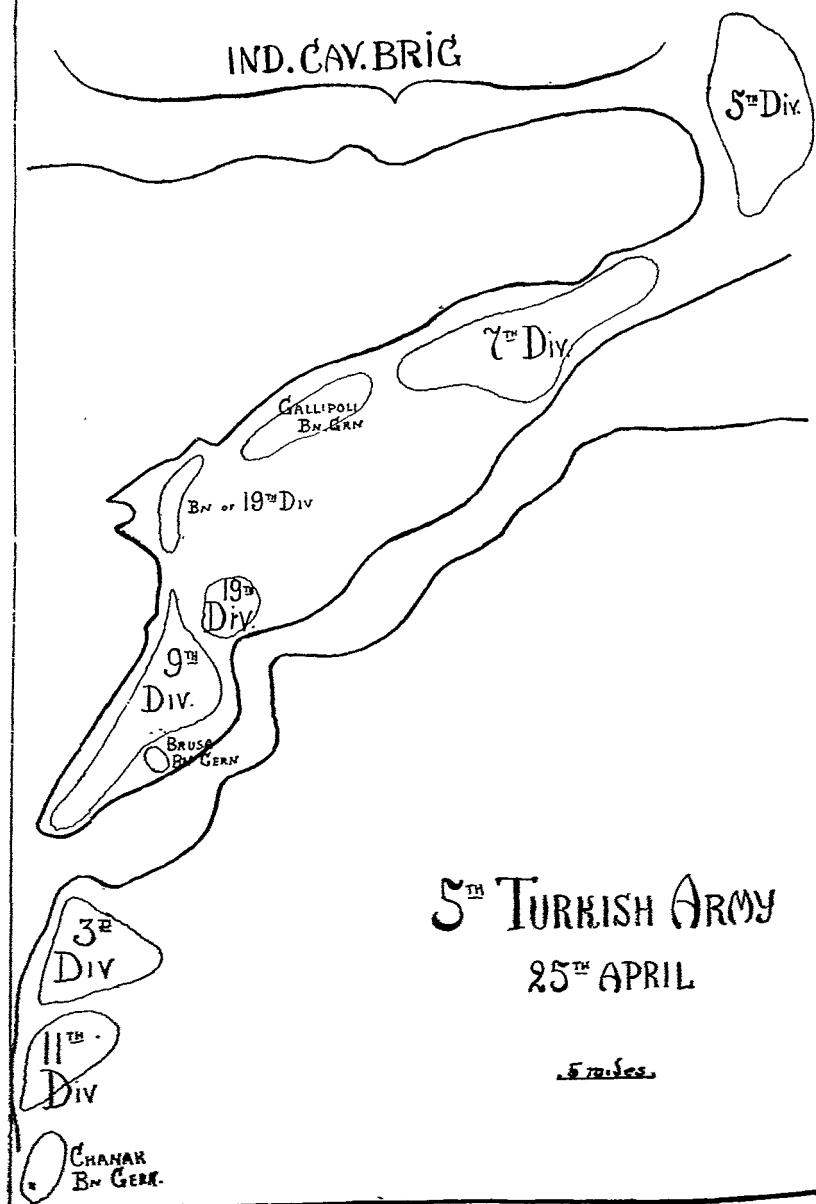
TURNISH BATTERY AT KILID BAHR

According to General Liman, the 5th Turkish Army of six infantry divisions, an independent cavalry brigade and a few gendarme battalions did not exceed 60,000 men. Turkish documents cited by the historian of the Australians give a "fighting strength of 62,077 all told," and this figure fits in well with that given in a report of the Turkish General Staff, 84,000 men all told.*

At the time of the Allied landing only one-third of the 5th Turkish Army was immediately available at Helles and Anzac. Another third had but the insignificant French feint at Kum Kale to face. The remaining third was far away from the scene of action, at Bulair.

*Note by General Hamilton: "All our own fights after the actual landing and for a fortnight afterwards were carried out by a 'fighting strength' never more than one-half the actual strength. This discrepancy is constant. Men are absorbed in all sorts of secondary yet vital work—water, food, digging trenches and wells, improving beaches, making piers, etc. 84,000 would very easily scale down to 62,000 in the Turkish battle line."

SKETCH MAP 1



One of General Liman's greatest handicaps lay in the necessity for guarding a long coast line. Bulair bothered him. "If, indeed," he writes, "the narrow mountainous strip which separates the Gulf of Saros from the Sea of Marmora fell into the hands of the enemy the 5th Army would be cut off not only from all communication by land, but also by sea." He also feared an attack on the Asiatic shore: "It was there that the most imminent danger was to be feared." Both of these statements were made long after the event, both are open to considerable question, and both smack of a desire to justify his own dispositions. Nevertheless the fact remains that all of the 60 miles from Bulair to Besika Bay had to be guarded.

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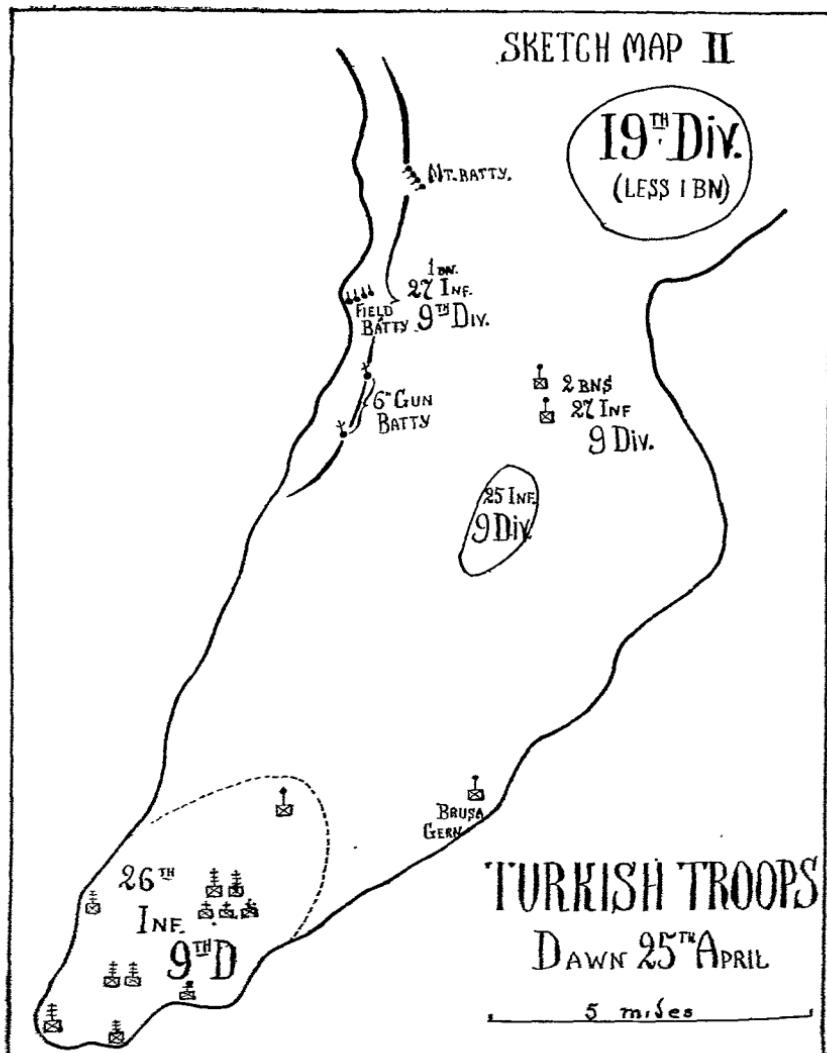


V-BEACH FROM THE CLIFFS TO THE WEST OF IT

Given General Liman's disposition, it follows that the Allied feints were for a time successful, though a Turkish General Staff report criticizes them on the ground that they were not as realistic as they might have been. The 11th Turkish Division deployed in front of Besika Bay before a French threat. The 3rd Division was thoroughly occupied by the landing of a French regiment at Kum Kale. To the north General Liman himself, with his 5th and 7th Divisions, watched intently the whole of the landing by the British warships and transports at the head of the Gulf of Saros. Still farther away the Russian Black Sea Fleet bombarded the entrance to the Bosphorus, and six Turkish divisions and 26 6-inch guns were held in readiness to face a Russian landing.

Fifteen hours after the Allied landing General Liman began to move troops south from Bulair, and the following morning he stripped that important position almost bare of men. The 11th Division

was brought north from Besika on the afternoon of the 25th, and two of its regiments had crossed the straits to Kilia by the evening of the 26th. Considering that the main Allied attack fell on exactly that sector of his defense which he says he considered the least



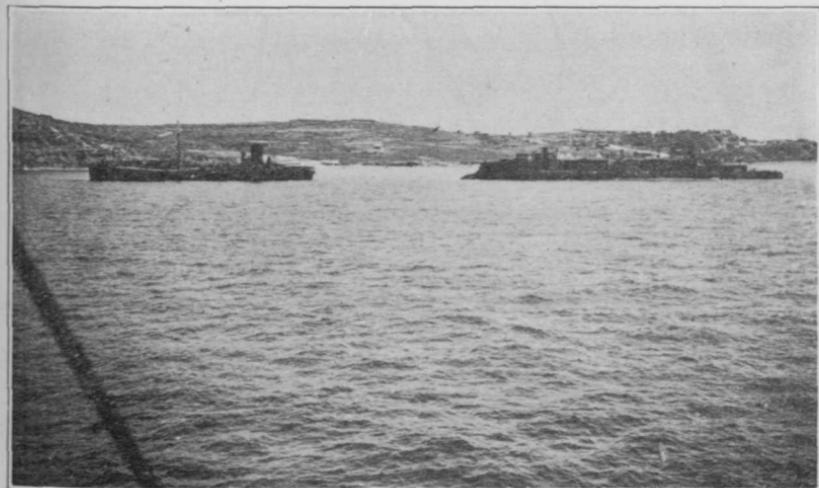
threatened,* General Liman showed flexibility of mind in re-establishing his equilibrium and moral courage in accepting the risks involved.

*Note by General Hamilton: "An immense compliment to me. There cannot be a greater compliment to a Commander than a statement by an enemy Commander that although his preparations were good you did not conform to them. The landing at V Beach was the one tactical move of mine which did fit in with Liman von Sanders' view of what I should have done—more's the pity!"

It should be noted, however, that even after the landing some troops had to be kept at Bulair and on the Asiatic coast. General Callwell estimates that during the entire campaign "on the average about one-third of the whole 5th Turkish Army was disposed at points where it exerted no influence whatever on the course of the struggle." This is probably an exaggeration, but considerable forces had to be kept out of the fight much of the time.

* * * *

The Allies began their landing in the early hours of the 25th of April, the 29th Division and three battalions of the Royal Naval Division at Helles, the Anzac Corps at Anzac Cove.

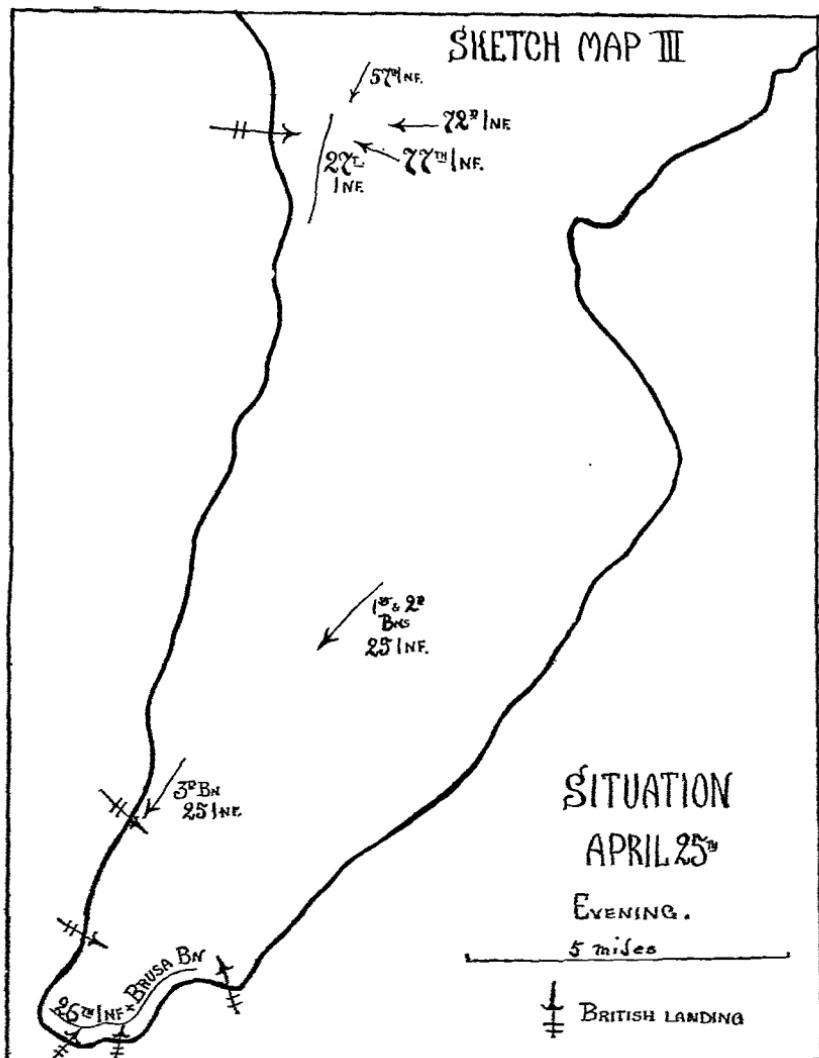


V-BEACH FROM THE SEA

The roads on the Peninsula were probably bad, but at least they were dry. The 19th had been a warm day, the 20th, 21st and 22nd clear and windy, and the 23rd and 24th clear and bright. Distances are short on the Peninsula. General Liman's scheme of defense, in spite of his dispersion, brought some forces against the Allied troops within a reasonable time after they had landed, and pinned them down before they had advanced far inland. Only at V Beach did the Turks succeed in holding up the actual landing.

Both at Helles and at Anzac the enormous disadvantages under which an army lands from the sea were immediately manifest. Organization is disrupted by the exigencies of boat space. No fixed headquarters exist, and communications are extremely difficult to establish. The function of higher command breaks down almost entirely; the greatest confusion reigns. Nothing illustrates this better than the amazingly small forces with which the Turks were able to check the British advance inland.

On the morning of the 25th there was but one regiment of infantry (the 26th of the 9th Division) and a few field batteries in the whole of the Helles area. Between X and Y Beaches there was a company, at W Beach another company, and at V Beach still



another. At S Beach there was only a platoon. There were trenches about the beaches, considerable wire at V and W, and one strong point between those two beaches in the form of a knot of trenches surrounded by wire entanglements. The troops in support consisted of two companies in the valley that runs down into Morto Bay. The

reserve comprised two companies plus three platoons at a point about half way between Sed el Bahr and Achi Baba. The remaining battalion of the 26th Infantry lay about a mile and a half to the north of Achi Baba, with outposts watching the middle section of the coast between Helles and Gaba Tepe. The companies had about 225 rifles each. To oppose the Helles landings there were therefore about 725 rifles at the beaches, 450 in support, and 625 in local reserve—total 1800 rifles, plus eight field guns.

Near the mouth of the Soghanlu Dere there was a battalion of gendarmes (of Brusa). About four miles west-north-west of the village of Kilid Bahr lay the reserves of the 9th Division, the 25th

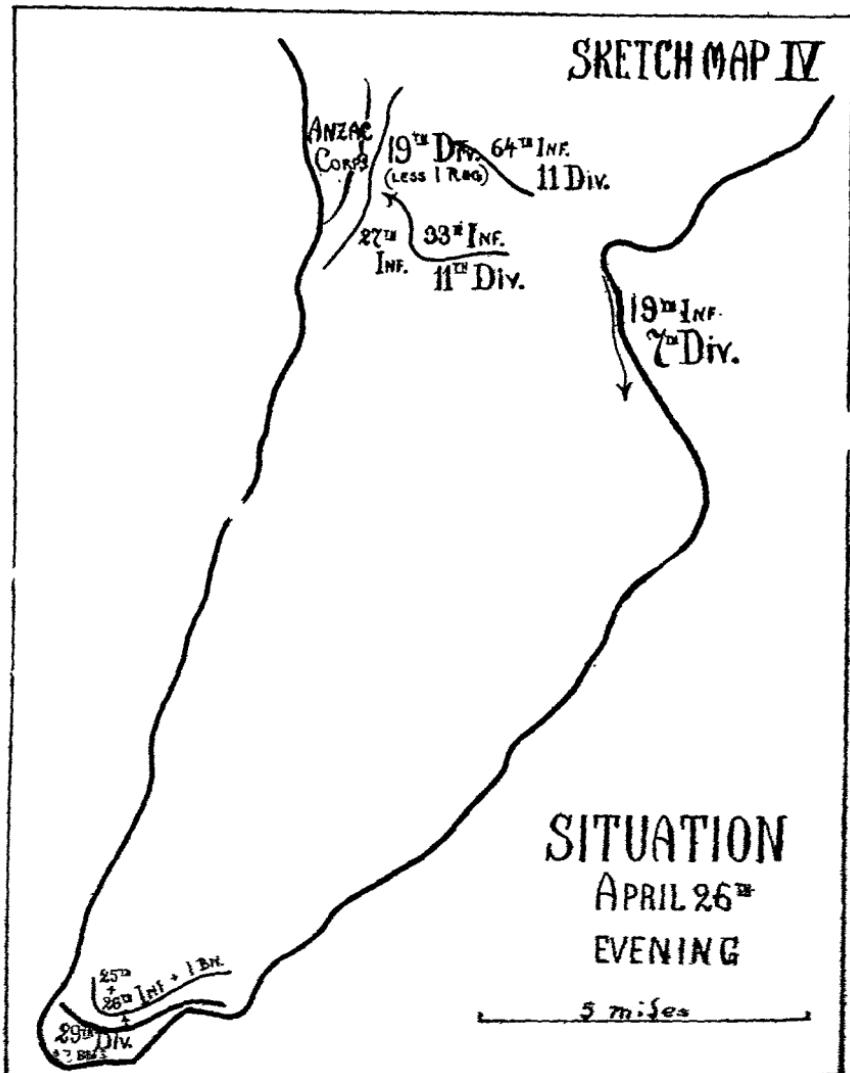


W-BEACH

Infantry Regiment and a few field batteries. These troops, together with the battalion of the 26th north of Achi Baba, and the gendarmes were ordered into the Helles fights. The Brusa gendarmes and the remaining battalion of the 26th joined that regiment in the south of the Peninsula during the day of the 25th. The 3rd Battalion of the 25th Infantry got into action that afternoon, against the two British battalions landed at Y Beach. But the 1st and 2nd Battalions of the 25th Infantry reached the battlefield only during the night of the 25th-26th. The next reinforcement to arrive at Helles was the 19th Infantry, of the 7th Division, which did not reach the front (north of Morto Bay) until the morning of the 27th, 36 hours after leaving Bulair. The 19th Infantry was followed by the 21st Infantry (7th Division) which reached the Helles sector on the evening of the 27th.

Disregarding casualties (which a Turkish General Staff report says amounted to 1897 men at Helles on the 25th and 26th), but

725 rifles at first opposed the landing, and by 8:30 a. m. only 1800 had been employed. By 2:00 p. m. 3600 rifles had become available, and by 4:00 p. m. 4500. This figure had been raised to 6300 by the morning of the 26th, and it was not increased that day. Figuring



British strength the same way, without regard to casualties, 6500 rifles were put ashore soon after dawn at W, X and Y Beaches practically simultaneously. In addition the force designated to land at V Beach occupied the attention of the Turks there. By 8:30 a. m. 7600 rifles had been landed, and by 9:30 a. m. 9500 rifles had come ashore. "Between 10:00 a. m. and 4:00 p. m.," says the British

Historical Section, G. S., "a considerable portion of the main body (29th Division—18,200 rifles) landed, but it was not till next morning that its disembarkation was completed. One field battery and two sections of a mountain battery (four 18-pounders and four 10-pounders) landed at night too late to go into action before dark." Adding the three battalions of the Royal Naval Division to this, it will be seen that the British had landed 21,000 rifles by dawn on the 26th.

At Anzac the Turks were also numerically outnumbered. But one battalion of infantry (the 2nd of the 27th Regiment, 9th Division) guarded the coast for a distance of three and one-half miles



SARI BAIR AND THE ANAFARTA VALLEY, FROM CHOCOLATE HILL

north and south of Gaba Tepe—an outpost line seven miles in length covered by about 700 rifles. There were some old trenches in this sector, dating from the Balkan wars, and a few new ones, but they played very little part in the defense. There were no wire entanglements in the sector. A battery of 6-inch guns (short) was in position, one platoon about one mile and the other platoon about two miles south of Gaba Tepe. There was also a battery of field guns on Gaba Tepe. Another field battery was posted on Lone Pine, with a mountain battery about 500 yards south of it. And that was all immediately available to resist the Anzac landing—700 rifles, a field and a mountain battery and a few guns far away on the flank.

A mile and a half to the west of Maidos lay the remaining two battalions of the 27th Infantry. Round about the village of Boghali and to the south of it was concentrated the *mass de manœuvre*—the 19th Division, newly formed, consisting of three infantry regiments (57th, 72nd and 77th), a mountain battery and two ox-

drawn batteries of field artillery. One battalion of the 77th Infantry had been detached to guard the coast from Ejelmar to Suvla.

The two battalions of the 27th Infantry marched on Anzac Cove as soon as the landing was reported, and met, about 8:30 a. m., the advancing British then climbing the spur 1500 yards west of Lone Pine. Moustapha Kemal, who later added the titles of Ghazi and Pasha to his name and became the President of the Turkish Republic, commanded the 19th Division. The story that he had ordered a maneuver for that very morning, the theme being a hostile landing near Ari Burnu, is probably a myth—the Turkish reports do not mention it. But it is a fact that, when the news of the Anzac landing reached him, he acted with great celerity and decision. Without waiting for orders and on his own responsibility, he marched with his best regiment, the 57th Infantry and his mountain battery first on Chunuk Bair and thence down the main ridge toward the Anzacs. About noon he ordered the 77th Infantry to march on Ari Burnu, and about an hour later, after consulting with the Corps Commander, Essad Pasha, he ordered the 72nd Infantry forward. The two field batteries of the 19th Division appear to have gotten into action by noon. The 57th Infantry became engaged early in the afternoon, and the 77th about dusk. But for all practical purposes the 77th must be counted out. It was an Arab regiment, the rank and file of which did not even understand the Turkish language. It took panic almost as soon as it reached the front, and about the only firing it did during the night of the 25th-26th was into the backs of the 27th and 57th Turkish Infantry. By daylight on the 26th it had scattered over the countryside and disappeared as a fighting unit. The 72nd reached the firing line during the night of the 25th-26th. It also was an Arab regiment, but it appears to have done much better than the 77th.

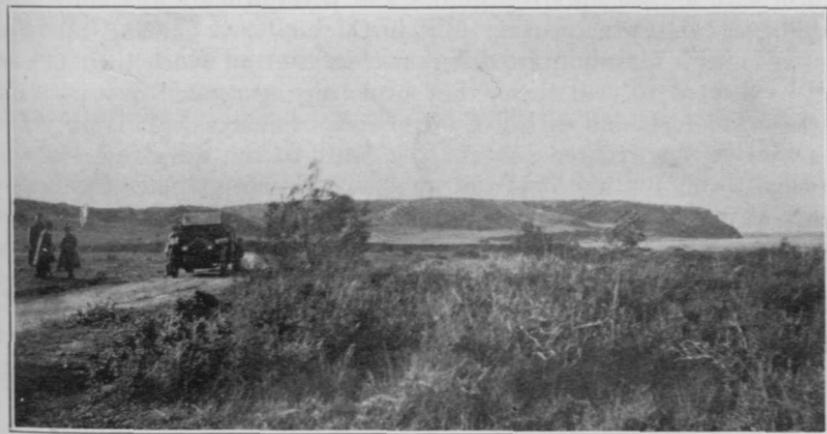
Late in the afternoon and in the evening of the 26th the 33rd and 64th Infantry Regiments of the 11th Division came in behind the Anzac front from Chanak, and on the evening of the 27th the 20th Infantry of the 7th Division arrived from Bulair.

So it came about that the Australasians faced less than 700 Turkish rifles on landing. Disregarding casualties, the Turkish forces had increased to 2100 by 8:30 a. m. and to 4200 by 2:00 p. m. By the morning of the 26th but 6500 rifles had become available and by that evening 12,000.

Now let us compare these figures with the British, reckoning in the same way, without regard to casualties. By 5:30 a. m. of the 25th 4000, and by 7:30 a. m. 8000 Anzac rifles were ashore. By 2:00 p. m. that day 12,000 rifles, a mountain battery and a field gun had been landed, and before dawn on the 26th 20,000 rifles and a second mountain battery were ashore.

But the Turkish resistance seemed very formidable to the Anzac Corps; so much so that the landing of the artillery was suspended on the afternoon of the 25th, and late that night General Birdwood reported his troops demoralized and suggested immediate re-embarkation.

There is no denying the courage and ardor of the 40,000 British troops who scrambled ashore at Helles and at Anzac with all possible speed. Unlike the later landing at Suvla Bay, there was no lack of determination, on the part of the leaders or men, to push forward as soon as their feet touched the sand. The idea of an advance at all cost had been drilled into them for months. Their



GABA TEPE, FROM BRIGHTON BEACH

landing was handled by one of the most efficient navies in the world, and covered by powerful batteries. And yet they were pinned to the ground by greatly inferior Turkish forces. One can only conclude that there are few organisms in the world weaker than an army when its feet are still wet with salt water.*

* * * *

One of the lessons to be drawn from the Allied landings and the Turkish defense is certainly that of the vital importance of the time element. The attacking troops are less vulnerable after they have reached land than they were in their approaching boats; they are less vulnerable after they have dug themselves into their first fox-holes than they were when wading ashore; they are still less vulnerable after they have advanced inland far enough to get elbow room and cover the landing of their reinforcements and supplies. And the converse of this is equally true, as the British found to their cost at

*Note by General Hamilton: "Quite true; and the main reason is that the men, having no transport, must be so overloaded with food, water and cartridges that, when wet through in addition, they become so exhausted they can hardly push along as fast on land as they should do on paper."

Helles, at Anzac, and later at Suvla ; the vital point about a landing is to get ashore quickly and to get well inland as soon as possible. In its broad outlines the story of the Gallipoli Campaign is that of three great landings, each of which was pinned to the ground within a mile or so of the beach. General Liman's scheme of flexible defense proved to be sound.

But of course time is not the only factor in landing. Discipline and training count, as they do everywhere, especially when the terrain is difficult. The Anzacs, with all their splendid qualities, were raw troops, and they would have done better had their bonds of discipline been stronger. Dash, courage and individualism carried them with a rush up steep gullies and precipitous bluffs more suitable to goats than to men. But in the confused fighting that followed, over a terrain quite different than that on which their officers had expected to lead them, they broke up into small groups. Cohesion was lost, and with it their chance of success. It is only fair to ascribe the greater part of the fault to the naval officers who landed them on a narrow front at almost the worst place that could have been chosen ; but it is nevertheless interesting to speculate on the suggestion which was later made, with some plausibility, that the regulars of the 29th Division might have done better at Anzac, while the Australasians, had they been landed at Helles, might have carried Achi Baba in their straightforward rush.*

THE SECOND PHASE

On the second phase of the campaign little need be said. It was a period of trench warfare, lasting roughly three months.

It is difficult to explain why General Hamilton persisted in throwing the weight of his attack into the Helles area during this period. To a certain extent he was, as he puts it himself, "obliged by circumstances to concentrate my main efforts on pushing forward towards Achi Baba so as to clear my main port of debarkation of shell fire." But that fire, annoying as it was, did not often interfere with movement or cause serious damage. Much of it came from the Asiatic side, and could not have been stopped even by the capture of Achi Baba itself. Perhaps the real explanation of the persistence of the Helles attacks lies in British character—in their bull-dog determination see the thing through on the lines on which they began.†

*Note by General Hamilton: "Quite interesting, but not sound. The thick bush of Anzac was familiar to the Anzacs. The Anzacs could not, at that date, have dealt with the barbed wire. Impatient rush tactics wouldn't do at Helles. On the other hand, one solid brigade of disciplined British troops, even of Territorials or of Indians, would have 'made good' and 'held on' and 'dug in' at the farthest points gained by the first rush at Anzac. But I had asked for them and had not got them (the Indians), though they were idle three days distant."

†Note by General Hamilton: "Had we sat still sickness and discouragement would have spread and the Turkish morale would have proportionately risen."

At any rate there is little to learn from the bloody attacks and counter-attacks of that period.* The Anzac situation remained practically unchanged. At Helles the Turkish lines were driven back a short distance. But the Turks always counter-attacked with vigor, and the dominating crest of Achi Baba and even the ruined village of Krithia remained well beyond Allied reach.

On the Turkish side sanguinary attack continued for some time. At first their object was, naturally, to throw the invaders into the sea. How long they continued to think they could do that remains a question. A report on the campaign by the Turkish General Staff criticizes the Helles attacks which "in one week cost us 16,000 casualties without any return. . . . The Commanding General (at Helles) should have known the value and importance of the pick and shovel, and not have melted away our best divisions by constant and very often unnecessary attacks."

Early in the morning of May 19th, on the Anzac front, they launched their last great attack. It had been ordered by Enver Pasha, following his visit to the front on May 11th. The Turkish General Staff account says they put into this attack 42,000 infantry (the 19th, 5th, 2nd and 16th divisions) on a three-kilometer front, and that it cost them 10,000 men. Like its predecessors, it ended in a bloody repulse. The Allied foothold on the Peninsula was precarious, with little depth in which to develop strength. But they held what they had won.

* * * * *

General Hamilton had always to remember that he was running a "side show," and he could not afford to be too insistent in his demands. General Liman, on the other hand, was a Prussian, running a campaign which was vital to Turkey—he had no need to be polite about asking for what he wanted. So each in his own way let higher authorities know his desire for more artillery, and especially for more artillery ammunition. Each was convinced that the enemy had great artillery superiority. Not until November did the 5th Turkish army receive artillery, or even artillery ammunition in appreciable quantity, from Germany and Austria. Even today Turkish veterans of the campaign dwell at length upon what they suffered under a heavy artillery fire to which they were unable adequately to reply. And General Hamilton's diary and despatches are largely concerned with the same matter. The sound of the enemy's bursting shell was, for each army, more impressive than that of their own guns!

It was a campaign which cried aloud for artillery, on both sides. Because it was lacking, offensive action by either side was always costly and almost always fruitless. The Allies needed espe-

*Note by General Hamilton: "Correct; except that trench warfare without artillery munitions is rough on the troops."

cially pieces of short range and plunging fire, from 6-inch howitzers down to trench mortars. They were greatly handicapped by their inability to break down the excellent Turkish trenches or cut their way through wire entanglements. The naval guns could help them but little. The Chief of Artillery at Helles thus summarizes the condition of his "starved" command throughout the campaign: "Insufficiency of guns of every nature; insufficiency of ammunition of every nature, especially of H. E.; insufficient provision made by the Home Authorities for spare guns, spare carriages, spare parts, adequate repairing workshops, or for a regular daily, weekly or monthly supply of ammunition; guns provided often of an obsolete pattern and so badly worn by previous use as to be most inaccurate; . . . total failure to produce the trench mortars and bombs* to which the closeness of the opposing lines at Helles would have lent themselves well—in short, total lack of organization at home to provide even the most rudimentary and indispensable artillery requisites for daily consumption; not to speak of downright carelessness which resulted in wrong shells being sent to the wrong guns, and new types of fuses being sent without fuse keys and new types of howitzer shells without range tables."

The Turks stood in almost equal need of more artillery. The terrain lent itself to artillery defense, and throughout the campaign the Turks possessed admirable observation posts dominating most of the Allied lines which they were unable to use to full advantage.

But, inadequate as was the artillery on both sides, the real lost opportunity lay in aviation. Before leaving London, General Hamilton's Chief of Staff asked Lord Kitchener for airplanes, and was withered by the roar of the old lion: "NOT ONE!" Nevertheless, the Allies managed to start the campaign with "five serviceable aeroplanes for the Army," plus some seaplanes from the naval air-drome at Tenedos. At the end of July they had about 80 planes, not more than half of which were available at any one time. The air force, says the Chief of Artillery at Helles, was "hopelessly deficient not only in numbers but also in quality. There were not sufficient pilots and there were no observers at all."

Fortunately for them, the Turks were equally weak in the air. Neither side possessed modern antiaircraft batteries.

The Dardanelles Campaign is probably the last great military operation that will ever be fought without material aid from the air. Had either side possessed real air supremacy in force, the opposing army would have suffered greatly.† The vital lines of communications on both sides lay throughout the campaign very much exposed to hostile air forces. The difficulties in landing either at Helles or at Anzac would have been immensely increased had the Turks been

*Note by General Hamilton: "Asked for in one of my very first cables—23rd March, I think."

†Note by General Hamilton: "This sentence should end: 'would have been routed.'"

powerful in the air. On the other hand, had the Allies possessed an efficient air force their losses on landing would have been greatly reduced and their subsequent operations enormously facilitated. "If," writes General Hamilton, ". . . we had only had a bombing force at our disposal, the Gallipoli Peninsula, being a very limited space with only one good road and two or three harbors on it, could probably be made untenable."

THE AUGUST ATTACK

The great British attack began on the night of the 6th-7th of August. A demonstration to contain the Turkish reserves in the southern end of the Peninsula was made on the Helles front during the afternoon of the 6th. A much more serious containing attack, conspicuously gallant even when measured by the high standards of Gallipoli, was made that same afternoon on Lone Pine and The Nek, on the Anzac front. After nightfall the main attack was launched from the left of the Anzac lines, the first objective being the crests of Sari Bair. During the night of the 6th-7th an army corps was landed at Suvla Bay with the double mission of obtaining a new base and of supporting the left flank of the main attack on Sari Bair. To deceive the enemy, feints were also made at the head of the Gulf of Saros, south of Gaba Tepe and opposite Mytilene.

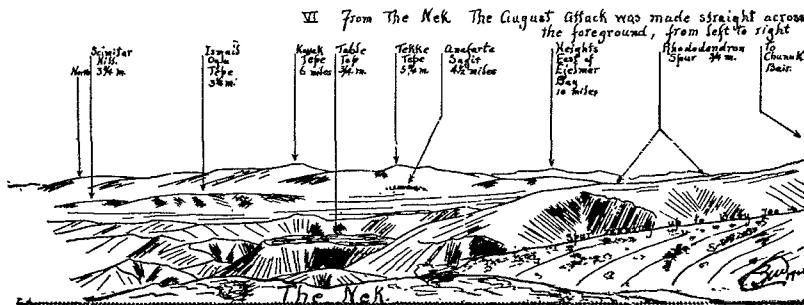
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Climbing Sari Bair in mid-summer, even on a fairly cool day and equipped with only a book and a walking stick, one gets a vivid impression of the difficulties which the heavily laden British troops must have encountered during those hot August days of 1915. How they managed the ascent in the dark against the fire of the enemy is difficult to imagine. The highest crest, Koja Chemen Tepe, is only 971 feet above the sea, but the going is bad all the way up. About a third of the ascent, and perhaps two-thirds of the distance from the sea to the crest can be made via one of the dry ravines. They are narrow and tortuous. The route is a trail—there are no signs of a road, or even of a prepared pathway. Beyond the ravines comes the real climb.

The slopes are very steep. Erosion has cut and slashed the whole seaward side of the ridge into a maze of spurs. General Cox picturesquely described the terrain by saying that "there does not seem to be any reason why the hill forms should go where they do. It has been done by tremendous rushes of water. It is a mad-looking country, and very difficult."

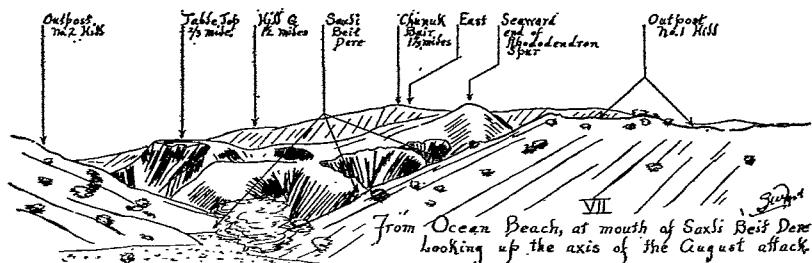
A few narrow plateaus jut out like flying buttresses, their sides falling away almost precipitously. The flat tops of these plateaus were of course under direct fire from the higher ground above them, and their seaward approaches presented almost unscaleable cliffs.

On the lower slopes of the ridge there are a few low trees, and the thorny scrub occasionally grows to the height of a man's shoulder. Above that it gradually becomes more insignificant, and the wind-swept crests are covered only by heather and a low, thorny weed.



The ground is soft limestone and clay mixed with marl. There is no rock near the surface. Hasty entrenchments could not have been particularly difficult, though the ground is somewhat stony and must have been very hard baked under the hot August sun.

Once the crest of the ridge is reached it becomes apparent that the other side, falling away towards the Narrows to the southeast, is

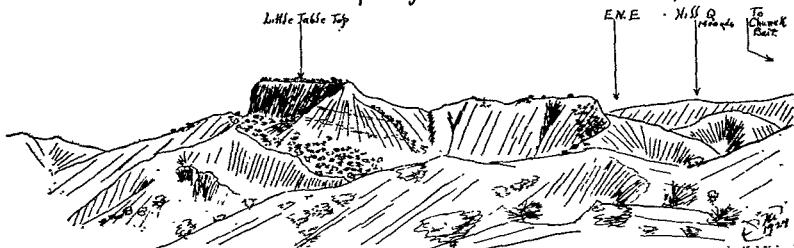


quite a different sort of country. The ground slopes down much less abruptly. Long, easy spurs run off towards Kurijadere and Boghali. The British had to scale the steepest and by far the most difficult side. The Turkish reinforcements arrived by the easier approaches from the southeast.

The ridge is commanding. A good stretch of the Narrows is seen from its crests. The waist of the Peninsula, from Gaba Tepe to Kilia, lies at one's feet. There are no natural obstacles in the way—it is all easy, downhill going to what were then the vital points on the Turkish lines of communication and supply, the Boghali road and the Kilia and Maidos landings.

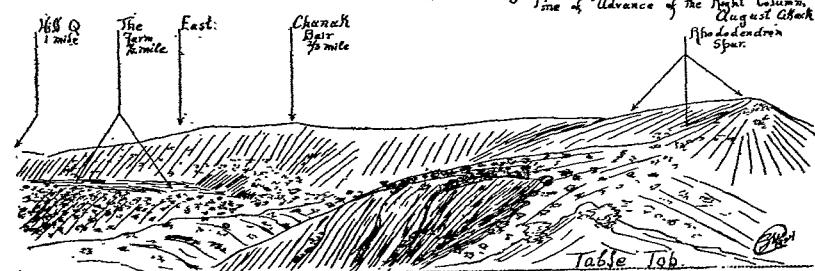
Of the several crests of Sari Bair, Chunuk Bair is certainly the key. Koja Chemen Tepe is a hundred feet higher, but its only connection with the rest of the ridge to the southwest is a narrow causeway—a hog-back ridge, separating the heads of two very deep and precipitous ravines. Even had the Turks remained on Koja

VIII. The Terrain Traversed by the August Attack
From just below and to the N. of Table Top



Chemen, the British might have passed over the ridge, once Chunuk Bair and Hill Q were in their hands, with only artillery interference from them. During the campaign the Turks had a saying that "Chunuk Bair is the key to Constantinople; Koja Chemen Tepe is its lock." This suggests that one possessed of the Chunuk key might have turned the Koja Chemen lock.

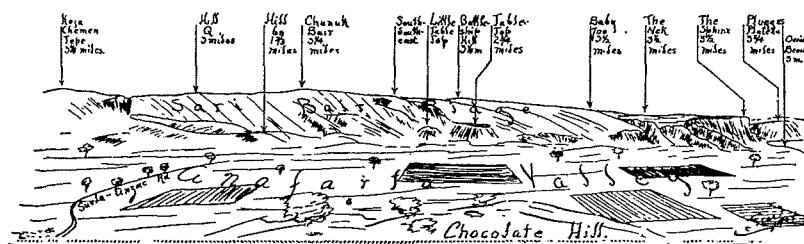
— Looking East from Table Top along the line of advance of the Right Column, August Attack



Hill Q is slightly lower than Chunuk Bair (certain maps and descriptions to the contrary notwithstanding). To the southwest the entire crest of the ridge falls away through Battleship Hill and Lone Pine to the sea. Throughout almost its entire length it is in plain view of Chunuk Bair, and the descent from the latter point is practically continuous along the crest of the ridge. Had the British captured Chunuk Bair their advance along or beyond the crest would have encountered no natural obstacle, and they could have rendered untenable every Turkish position on Sari Bair, except Koja Chemen Tepe, which they might have masked.

Sari Bair would have eventually given the British command of the lower Peninsula, from Gaba Tepe-Kilia down. The Turks admit as much. The Boghali-Maidos road would have been commanded, as well as the Kilia landing. The Turkish forces on the plateau of Kilid Bahr and below Achi Baba would have been starved out—

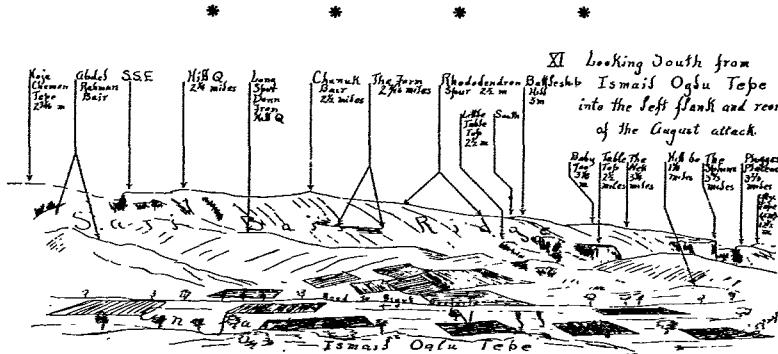
X. Looking S.S.E. from Chocolate Hill into the rear of the August attack



General Hamilton recognized that it would take time, but it was a practical certainty.

And with the capture of the lower peninsula the control of the Narrows would have fallen into the Allies' hands. The forts would have been rendered useless and the mine-fields could not have been defended.

XI Looking South from Ismail's Oglu Tepe into the left flank and rear of the August attack



Now let us trace the development of General Hamilton's plans. On the 8th of June he had been informed that the new coalition government in England had made up their minds to see him through, and that they would send him three divisions of the new Army to reinforce the eight divisions and four separate brigades already at Gallipoli. Three days later General Hamilton notes in his diary: "Our whole scheme hinges on these crests of Sari Bair which dominate Anzac and Maidos; the Dardanelles and the Aegean." This is the first indication of the great change in plan which shifted the axis

of the attack from the hopeless slopes of Achi Baba* to the heights that command the waist of the Peninsula.†

General Hamilton frankly says that the plan of the August attack did not originate with him: "The idea was born at Anzac." So we hear no more of the long southern route through Achi Baba to Kilid Bahr. Although three Allied attacks were made on the Helles front in June and the first half of July ("to keep the enemy's eyes fixed rather upon Helles than Anzac") Hamilton had at last realized that "Sari Bair is the 'keep' of the Narrows; Chunuk Bair and Hill 305 (Koja Chemen Tepe) are its keys." (Diary, 24th June).

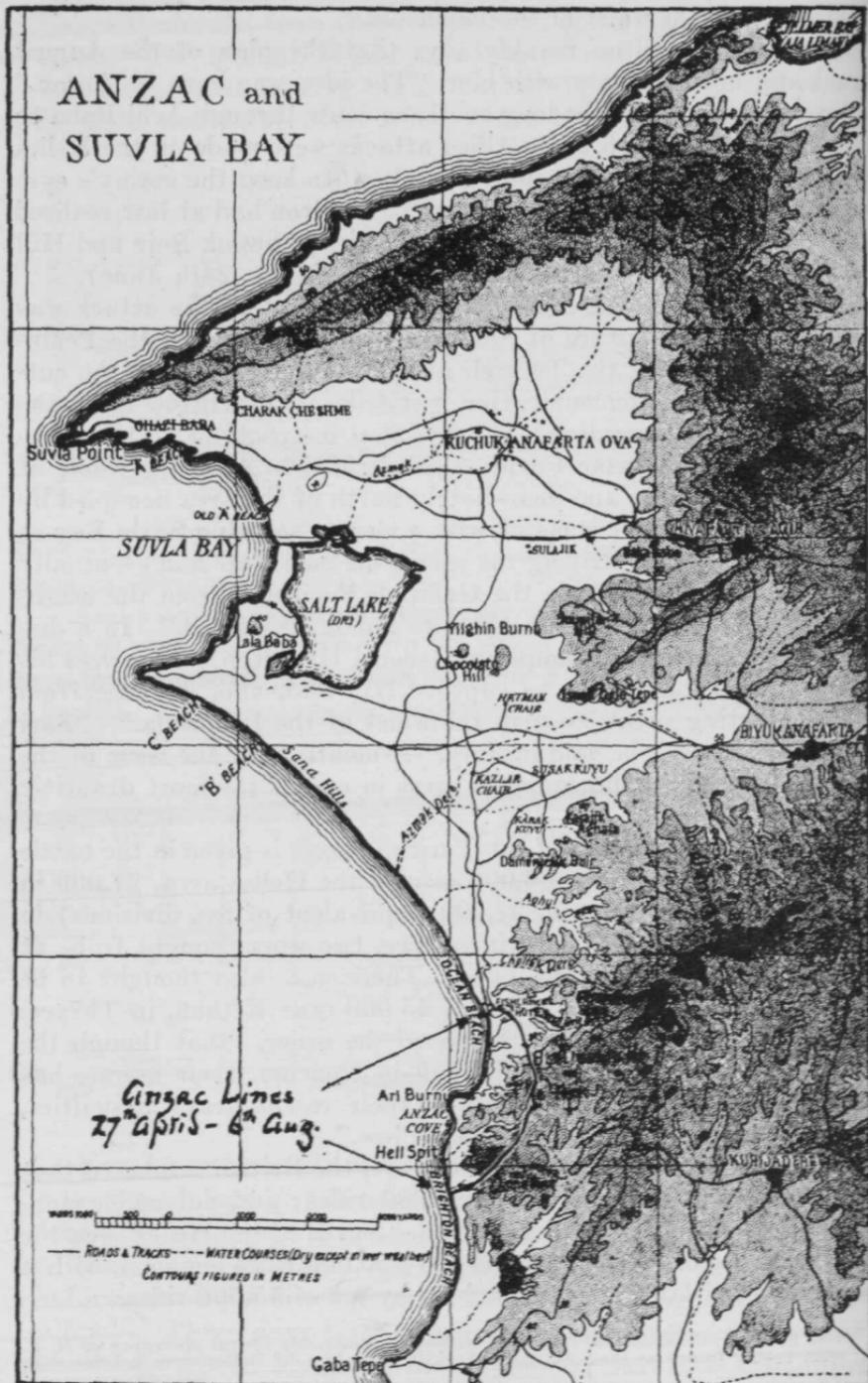
It should be noted that the primary object of the attack was topographic, the capture of Sari Bair and the waist of the Peninsula. The defeat of the Turkish army was to result from the cutting of its lines of communication, not from its overthrow in battle. "The General commanding," ran the final instructions to the Commanding General, Anzac Corps, "has decided to mass the whole of his reinforcements in and immediately north of the area occupied by the corps under your command, with a view to securing Suvla Bay as a base of operations, driving the enemy off Sari Bair and eventually securing a position astride the Gallipoli Peninsula from the neighborhood of Gaba Tepe to the Straits north of Maidos." In a dispatch written after the campaign General Hamilton summarizes his object as "a strong push to capture Hill 305, and, working from that dominating point, to grip the waist of the Peninsula." "Sari Bair is my secret," he said in July. A month later the issue of the campaign hung in balance on its crest in one of the most dramatic moments of the war.

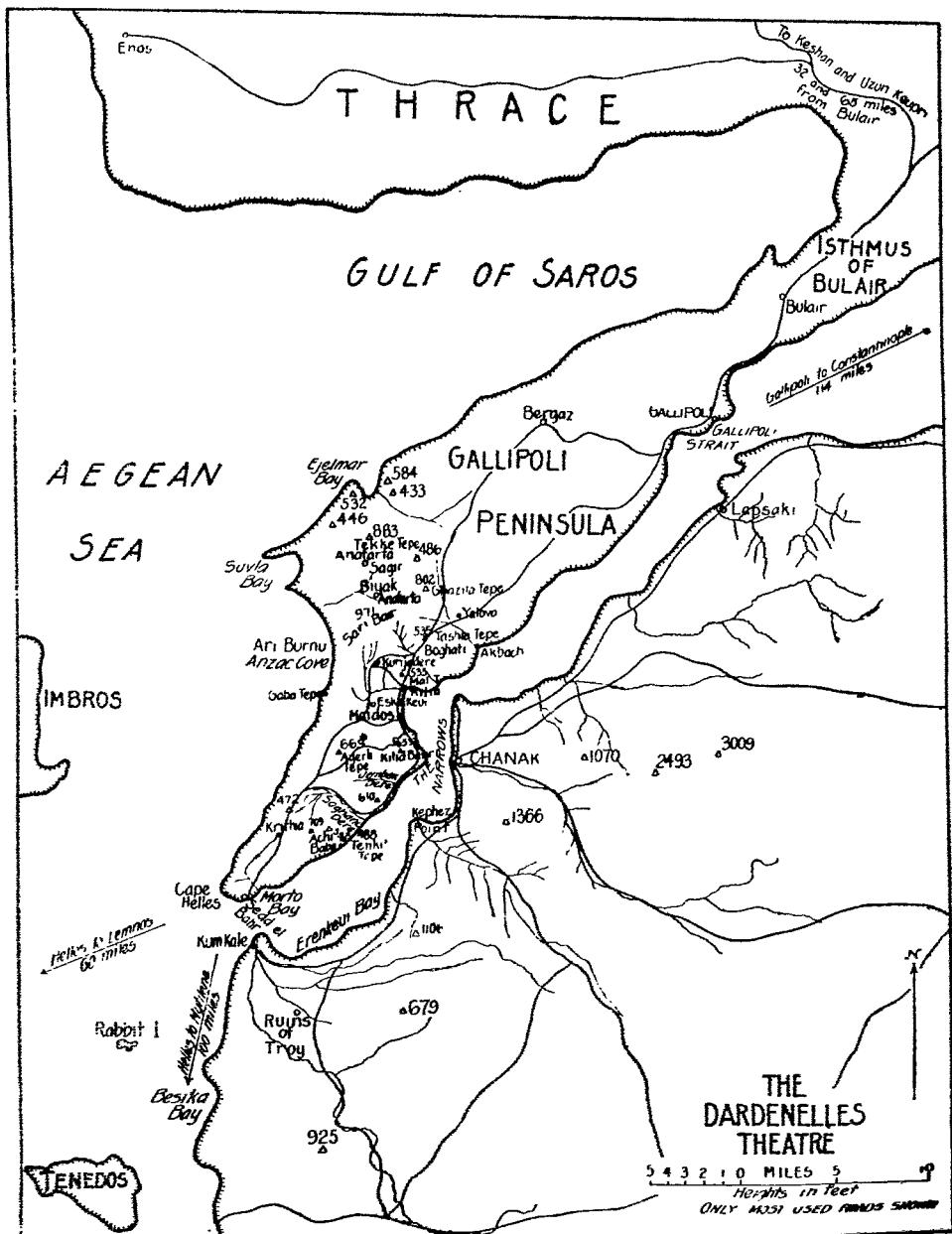
The British estimate of the Turkish forces is given in the battle order issued August 2nd: 36,000 men in the Helles area, 27,000 in the neighborhood of Anzac, 37,000 (equivalent of five divisions) in reserve. Of the five divisions in reserve, two were thought to be at Bulair and one near Ayerli Tepe. There were also thought to be 12,000 men on the Asiatic side and 45,000 near Keshan, in Thrace. "All reports tend to show," continued the order, "that though the enemy may be expected to fight well in trenches, their morale has suffered considerably as a result of their recent heavy casualties, and that their stock of ammunition is low."

Against their main attack, therefore, the British estimated that the Turks could bring not over 50,000 rifles; and not much more than half that number if all went well. North of the Helles area the British, on the other hand, would have 50,600 rifles engaged, with a reserve on the islands or approaching by sea of 15,500 rifles.

*Note by General Hamilton: "Hopeless without a reasonably liberal allowance of H. E. Still, even taking things as they were, the Turkish casualties at Helles were heavier than at Anzac or Suvla."

†Note by General Hamilton: "Remember, in actuality much of the point of this plan lay in the fact that a great mass of the enemy lay south, round about Achi Baba, where they would be cut off. As already pointed out, until time, work and organization had improved the water supply, a move on this scale was not possible."





Sari Bair was the key to victory; the Anzac Corps and the reinforcing divisions from England the means by which that key was to be seized.

* * * *

But (crowning fatality) the greater part of the reinforcing divisions were not thrown against Sari Bair in direct attack. Of the 39 battalions which arrived before the attack, but 17 were landed on the Anzac beaches.* The remaining 22 battalions were landed as a separate army corps at Suvla Bay. The Suvla Corps was also reinforced during the attack by the arriving 24 battalions of the 53rd and 54th Divisions. After months of vain fighting on the southern end of the Peninsula, the attack now reached too far to the north. A force which might easily have tipped the scales to victory at Chunuk Bair accomplished nothing on the northern flank.

It is true that the 9th Corps, landing at Suvla Bay, was meant to support the attack on Sari Bair by an advance on the left flank. It is also true that this Corps was handled so badly that its possible influence on the main attack cannot well be judged. As events transpired, the main attack dragged out over three days, and the Suvla Corps might have been decisive had it been aggressive.†

Nevertheless, it must not be forgotten that the forces landed at Suvla were intended only to complement the main attack, and in but a secondary and contingent sense to form a part of it. "Anzac was to deliver the knock-down blow," writes General Hamilton, "Helles and Suvla were complementary operations." The primary mission of the Suvla force was not concerned with the main attack. "Your primary objective," runs the instructions to the Commanding General 9th Corps, "will be to secure Suvla Bay as a base for all the forces operating in the northern zone. Owing to the difficult nature of the terrain, it may be possible that the attainment of this objective will, in the first instance, require the use of the whole of the troops at your disposal. Should, however, you find it possible to achieve this object with only a portion of your force, your next step will be to give as much assistance as is in your power to the G. O. C. Anzac in his attack on Hill 305, by an advance on Buyuk Anafarta, with the object of moving up the eastern spurs of that hill."

This is pretty thin support to expect of 15,000 troops landing right on the flank of the main and vital attack. And, to make matters worse, the Suvla Corps Commander, in presenting his plans, laid stress on the improbability of his being able to spare troops to assist the Anzac force.

Since the war an impression has grown up that Suvla was meant to be the great and decisive flank movement, the most important part

*Note by General Hamilton: "The absolute maximum that could be watered."

†Note by General Hamilton: "Correct."

of General Hamilton's battle combination. The battle as a whole is usually given the name of Suvla. A Turkish General Staff report speaks of the possibility of the Suvla Corps marching as far inland as Boghali, and suggests that, had it so advanced with perseverance and force, it would have been successful. General Liman, commenting on a minor action which he bombastically calls "the third crisis of the battle," says that "a decisive attack . . . could have easily penetrated across the Peninsula, utilizing the great depression which ends at Akbach." The British orders, however, show clearly that nothing of the sort was intended. At most it was hoped that two brigades from Suvla might scale the eastern spurs of Koja Chemen Tepe some time during the 7th of August.*

Even had the Suvla Corps been able to carry out its primary mission promptly, the troops it sent against Koja Chemen could not possibly have synchronized with the main attack unless the latter had been checked by the enemy for a considerable time.† The instructions to the Commanding General 9th Corps admit as much: "An advance by your force from the east (of Koja Chemen) will . . . be of great assistance in the event of this (main) attack being checked." The main attack was launched from the Anzac lines at 9:30 p. m. on August 6th. These lines were less than two miles from the objective, Chunuk Bair-Koja Chemen Tepe, which the British planned to capture between 2:30 a. m. and dawn on the 7th. The first troops of the Suvla Corps did not land until 10:00 p. m. August 6th, and the landing continued throughout the night. From Suvla to Koja Chemen Tepe via Buyuk Anafarta is a good six and a half miles, across an unknown country, with a climb at the end at least as difficult as Chunuk. It could hardly have been expected that raw troops could land at night on open beaches, make a wide flanking night march across such a country and join the main body which had started before them and from a point much nearer the common objective.

So far as the main attack against Sari Bair was concerned, there appears to have been no tactical necessity for the Suvla flanking force. The British were not far wrong in estimating the enemy forces in the Anafarta area as about five battalions, a field battery and two heavy guns—a force inadequate to threaten seriously their flank. Their battle instructions also indicate that they did not believe the Turks had any considerable body of reserve troops between Koja Chemen Tepe and Gallipoli—and again their estimate was substantially correct. The one essential was to deny to a few Turkish guns Ismail Oglu Tepe, Chocolate and Scimitar Hills.‡

*Note by General Hamilton: "Correct; also that by the 8th the reverse slopes of Koja Chemen Tepe should be under our artillery fire."

†Note by General Hamilton: "They could not tactically have synchronized, but they must have drawn troops from the Turkish forces available to defend Sari Bair."

‡Note by General Hamilton: "Have you observed from Scimitar Hill how far their artillery could have enfiladed the reverse slopes of the Sari Bair range?"

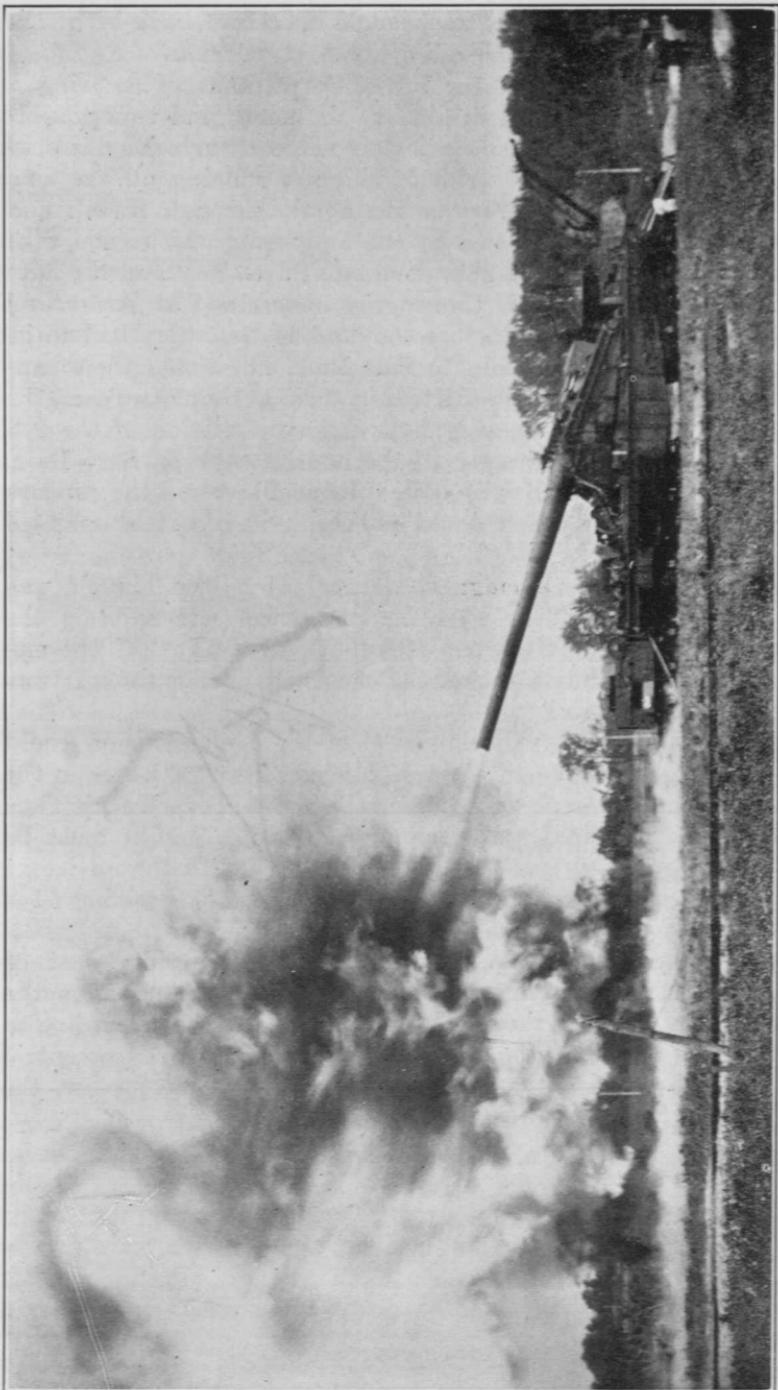
The left flank of their main attack could therefore have been well covered by a few battalions instead of an Army Corps.

The primary mission of the Suvla Corps, that of securing a base, involved the capture of heights to the north and topographically quite independent of the Sari Bair ridge. Suvla Bay is surrounded by a semi-circular series of heights, running all the way around from Kiretch Tepe Sirt to the north, through Kavak and Tekke Tepes to the east, down to the long spur which ends with Ismail Oglu Tepe. These heights dominate Suvla Bay and the flats to the east of it, and it was thoroughly understood at Army and Corps Headquarters a week before the landing that they had to be taken. But they do not dominate Sari Bair, nor would their capture have materially aided the British in their attempt to reach the Narrows via Sari Bair. In short, the primary mission of the 9th Corps, far from aiding directly in the main attack on Sari Bair, extended the scope of the British difficulties and involved the capture of formidable heights which could not have immediately affected the main issue.

Irresistibly, as by a magnet, General Hamilton himself was drawn towards Tekke Tepe when he intervened personally in the Suvla operations on the afternoon of August 8th. "Tekke Tepe was the key of the whole Suvla Bay area," he wrote that night. It was—but what of Sari Bair?

On the following day he hoped that the 10th Division could "occupy the high ridge to the east of Ejelmer Bay"! Later in the day he gave the 9th Corps Commander the Tekke Tepe-Kavak Tepe ridge as "your principal and dominant objective, and it must be captured." He even decided (strangely enough with the advice of the Anzac generals) to throw in his last reserve, the arriving 54th Division, to secure that ridge.

Now Tekke Tepe is over four miles, and the ridge east of Ejelmer Bay a good seven miles from Sari Bair. And from the landing beaches at Suvla they lie at right angles to the direct line to Sari Bair. In other words, the terrain at Suvla forced eccentric advances which could not have supported, in any direct sense, the main attack on Sari Bair.—(*To be continued.*)



LATEST TYPE RAILWAY ARMAMENT TO BE DECLARED STANDARD FOR MANUFACTURE

14-INCH GUN—Model 1920 Min. Length 50 cal.; m. v. 2650 f/s; Range 5,000 yds.; wt. of projectile 1,560 lbs.; wt. of powder charge 663 lbs. 14-INCH GUN RAILWAY MOUNT. Loading angle (-70); max. firing angle ($+59$); traverse employed 360° ; top carriage traverse (on track) 7°

PROFESSIONAL NOTES

Railway Artillery

EDITOR'S NOTE: *The reader's attention is invited to the three photographs of the 14-inch railway gun shown in this issue of the JOURNAL and described in the following extracts from Army Ordnance. Although the necessary guns for this type of armament are on hand, only one carriage has so far been completed. It has been tested by the Ordnance Department and accepted as satisfactory. As soon as funds are available, guns and carriages will be sent to the Coast Defenses of Los Angeles for service test therewith.*

The war hastened the use of guns and howitzers of large caliber mounted on railway carriages, and many different types were produced and used with great effect by both sides. Since then the railway mount has been still further improved and special consideration has been given to the use of this type of artillery for seacoast defense purposes.

The 14-inch gun railway mount, Model of 1920, is mobile in that it can be transported over the average railway lines, and its dimensions are such that it will pass through standard railway clearances. The unit can be fired either from the track, or, if time permits, it can be lowered down and bolted to a concrete foundation.

It is equipped with its own power plant, which permits the use of electric motors for elevating the gun, traversing the whole carriage, handling the ammunition, and for compressing the air required for gas ejection. The range of this weapon is approximately 23 miles, with a 1600-pound projectile, and it can be fired at the rate of at least one shot per minute.

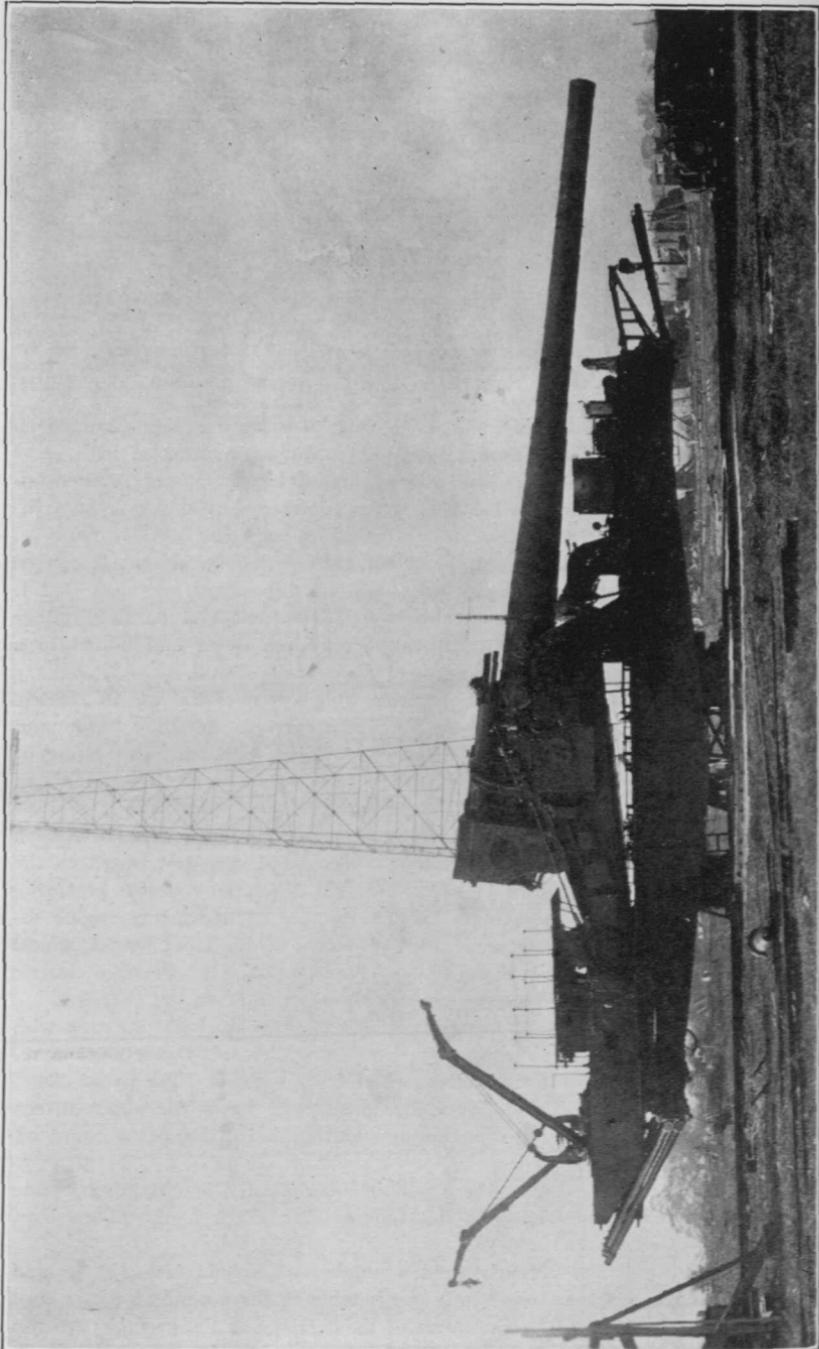
The firing tests of the 14-inch gun railway mount, Model of 1920, have been completed at the Aberdeen Proving Ground. The mount was first tested on the 360° traverse concrete platform. When the mount is on the concrete platform, the trucks are removed. The power plant, consisting of a Sterling engine directly connected with a 50 K. W. generator, is located on the front trucks, which, after removal, are run a short distance away from the mount. Flexible electric cables are used to connect the power plant with the motors on the carriage.

A rapidity test consisting of firing five rounds was conducted. Starting with the projectile and powder on the ground, breech block closed, the total time required to fire five shots was five minutes and thirteen seconds. The proof officer stated in his report that it was necessary to suspend firing for about fifteen seconds, as in operating the projectile ammunition hoist the cable came off the sheave.

It is therefore believed that there will be no difficulty in obtaining a rate of fire of one shot per minute with this mount after slight modifications have been made.

The carriage was also recently fired a number of rounds from the ground platform. The carriage was found to be very stable on the ground platform even at low angles of elevation. The movement of the carriage on the ground platform is very slight.

The firing tests indicate that the mount should meet expectations as regards strength and stability.



14-INCH RAILWAY MOUNT, MODEL 1920, ON PERMANENT EMPLACEMENT

The Fire Adjustment Question

By MAJOR E. J. CULLEN, C. A. C.

In the attempt to develop a satisfactory method of fire adjustment for use in moving target operations, the Coast Artillery Corps has encountered a series of baffling difficulties. It has met with intricate complications caused by the conflicting character of those two essential requirements of the moving target problem, time and precision. The shorter the time available for fire-action against a moving target, the greater is the necessity for precision if effective results are to be accomplished against the exposed objective.

By an analysis of the mission of artillery, and of the essential considerations in the accomplishment of this mission, we can determine the relative importance of the various factors pertaining to the problem. From this we can determine whether or not fire adjustment is necessary. Having settled that all important question we may then intelligently consider the suitability of any proposed method of adjustment by determining the effect upon the important factors of the problem that will be caused by the use of the specified method of procedure.

The *mission of artillery* is to deliver *suitable fire effect* at any instant that it may be demanded by the tactical situation at hand.

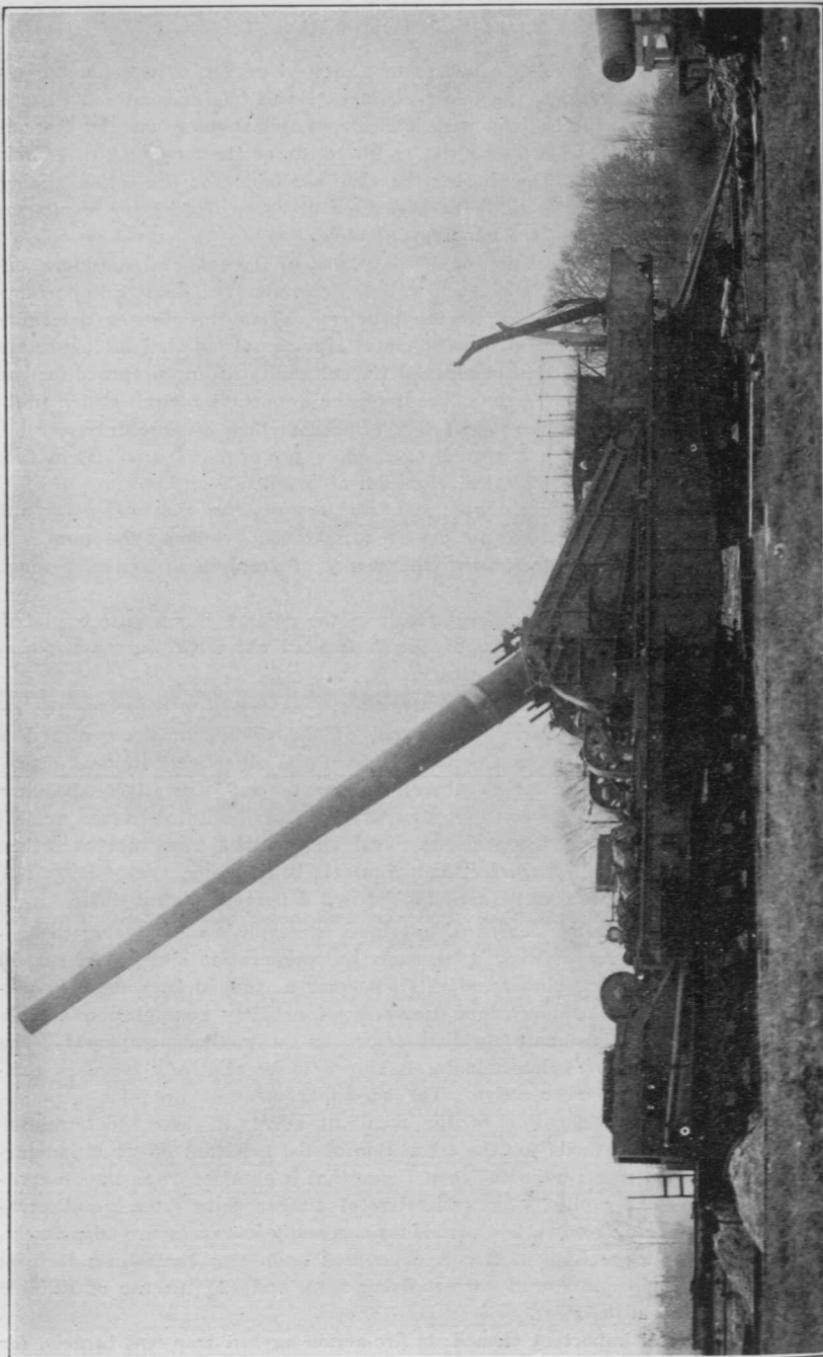
Suitable fire effect is that degree of *effectiveness of fire* that will delay and restrict enemy movements, disrupt enemy formations, overcome the power of enemy effort, and ultimately deprive the enemy of freedom of action, through the damage and destruction inflicted upon him.

Effectiveness of fire is the direct result of the *volume of fire* that is placed, by the use of proper precision, upon the designated objective, during the *time* that this objective is exposed to attack.

Volume of fire is that quantity of fire that is necessary to overcome the resisting power of the objective. The extent of the volume of fire required is dependent solely upon the character and size of the objective. In field operations, the objective is of relatively vulnerable character and, figuratively speaking, is of small size as compared to the destructive area of the fire delivered against it. In coastal operations, the armored naval vessels that constitute objectives are of powerful resistive character, and, figuratively speaking, are of large size as compared to the destructive area of the fire delivered against them.

Precision of fire is the degree of exactness accomplished in placing the delivered fire upon the objective. It demands the preparation and use of correct firing data. "Correct" implies freedom from error as judged by some acknowledged standard. The acknowledged standard of artillery computation accepts the existence of indeterminate residual errors in the methods employed. The resultant effect of these indeterminates is known to be relatively large as compared to the size of the objective. The accomplishment of precision depends, therefore, upon the elimination of the resultant effect of these indeterminate errors. All known methods for the estimation of the resultant effect of indeterminate errors require the use of a *Mean Value* that is obtained from the observation of accomplished results. The estimation of a mean value from the observation of artillery firing results, is a procedure commonly known as fire adjustment, hence we see that precision of fire is dependent upon two controlling factors: (1) the preparation and use of correct firing data, and (2) the use of suitable measures for fire adjustment.

Time is a most important element in fire-action against transient targets, for in this case effectiveness of fire can be accomplished only during the period that



14-INCH RAILWAY MOUNT, 1920, ON PORTABLE TRACK EMBLEMENT

the objective is exposed to attack. In field operations, fire action against transient targets is the exception rather than the rule. The bulk of the fire is delivered against stationary objectives, thereby permitting the use of slow and deliberate methods in the conduct of fire. In coastal operations, where the bulk of the artillery fire is delivered against naval vessels, transient targets capable of high speed, rapid methods of firing must be employed in order to insure effectiveness of fire. The relatively short time that the target is exposed to attack, together with the ability of the target to change its position promptly and rapidly, renders unsuitable for this problem the slow and deliberate methods of firing used against stationary targets.

Fire efficiency is "hits per gun per minute," an expression whose factors are hits accomplished, number of guns, and time. When fire effectiveness is considered in its proper relation to fire efficiency, the elements of the former, *precision*, *volume* and *time* appear in the full importance that they occupy in the fire problem, and we can recognize the degree of influence exercised by each of these elements. We can also recognize the direct relation of *precision* to *hits accomplished*, and of *volume of fire* to *number of guns*.

In any consideration of fire efficiency the basis of all discussion must be the expression *hits per gun per minute*, or H/GT . It is readily apparent that if the factor H is reduced in value to zero, the value of the fire efficiency will become zero and that no improvement of the values of the G and T factors can prevent it from becoming zero in such case. This is merely another means of emphasizing the fact that *hits accomplished* is the only positive measure of the efficiency of fire or of the effectiveness of fire. Without *hits* there can be no efficiency nor effectiveness. From this we can appreciate the importance of precision, that element of the problem which possesses a direct and controlling influence upon *hits accomplished*. But we have seen that precision is absolutely dependent upon two factors, one of which is Fire Adjustment. Is any further proof required as to the necessity for the use of fire adjustment in any action where effectiveness of fire is demanded and where efficiency is desired?

When There Is No Peace

EDITOR'S NOTE: *The following by Mr. Nicholas Roosevelt was published in the Nov. 5, 1924, issue of OUTLOOK. It is here republished through the courtesy of that magazine.*

To the false idea that war ends when peace has been declared is due much of the confused thought about the recovery of Europe. As a matter of fact, war continues in a modified form, with commercial and political rather than with purely military weapons, until the terms of the peace treaty have been carried out or so modified that the loser no longer deems it worth while to resist or the victor to demand fulfillment.

Two reasons explain the common failure to grasp this truth. The first is that in war interest is centered almost exclusively on military and naval activities. Every one longs for the day when these shall cease. An armistice, therefore, which stops the armed fighting, is hailed as the end of the war, even though it be recognized that peace is not formally declared until a treaty has been negotiated, signed, and ratified. The second reason is that only a few statesmen appreciate the force of the contention of such military philosophers as Clausewitz that war is simply the carrying out of national policy by force instead of by diplomacy. In other words, war is not a detached event which begins with the first act of violence and ends when the fighting is done. Even though it may

break like a sudden flood, it is the direct outgrowth of national policies and international commitments, and may be said to flow out of peace. Although diplomacy for the moment gives way to the sword, both are the servants of the same policy.

Now the truth is that just as war flows out of peace, so peace flows out of war. The stream is swift if the victory has been overwhelming. But it is slow if there has been peace without victory.

The philosophy of this reasoning is based on the theory that the purpose of war is to impose our will upon the enemy. Our will may be merely to check him. It may be to drive him out of our territory or to force him to surrender part of his territory or commercial privileges. It may be to make him pay heavy reparations. It may be to annihilate him. Whatever the specific objective, however, the purpose is the same—to make him submit to our wishes.

More often than not these wishes are known to him before the war begins. At other times they are set forth in the declarations of our leading statesmen during hostilities. Some of them will be stipulated in the armistice agreement. Most of them will be embodied, either openly or covertly, in the conditions of peace.

Now it stands to reason that the stronger the enemy when he finally submits, the more difficult it will be for us to make him accept our conditions. His strength, be it noted, depends not only on his military and naval forces and reserves, but also on his economic condition and the morale of his people.

If by means of war we have been able to inflict a crushing blow, he can do little except submit to our peace terms. But if, on the other hand, he has seen that defeat is inevitable and accordingly sues for peace while he is still strong in order to save as much as possible out of the wreck, he will have an advantage over us in the enforcing of peace terms which is directly proportionate to our will to make him carry out the treaty, "precept upon precept, line upon line."

In other words, we may be able to force, lure, or tempt him into negotiating and signing a treaty, but unless we can enforce the peace he may soon become strong enough to evade it. In particular is this true if we have had allies in the war, and have not alone the strength to counter renewed resistance on his part. We are then dependent for the enforcement of the treaty terms upon the unity between ourselves and our allies. This naturally gives the enemy the chance to profit from our division. If he can find or foment enough divergencies among us, he can count on being able gradually to wring concessions from us.

His object, of course, is to retain his strength or regain it at the earliest possible moment. If he is forced to accept peace terms which, when carried out, will keep him weak, he will do all in his power to circumvent or to nullify those terms. In other words, he will seek by evasion, resistance, or diplomacy to escape the obligations which he has accepted.

His methods will be dictated by expediency, and will be measured only by his ability to "get away with them." In considering his plan he will ask himself but one question, "Does it pay?" He will weigh the chances of success and the cost of failure, with a special eye to the penalties involved.

In this manner, the war may be carried on during years of declared peace. The object of the vanquished is to save as much as possible of the wreck. The victor's aim is to get as much as possible out of the vanquished. In proportion to the determination and skill of the vanquished will he succeed. It is clearly to the loser's interest to do anything to thwart the victor that will not have a repercussion on himself. And he will keep it until until it ceases to pay, or until he has

so far met the victor's wishes that the latter no longer cares to force the issue. Then, and then only, will there be true peace.

This is the important thing—that peace is not at hand until the treaty terms have been carried out or changed. The signing of the treaty is little more than a declaration of policy. It remains to enforce that policy or drop it. In general, the victor seeks to put it into effect and the vanquished to abandon it. Efforts towards modification come almost exclusively from the vanquished, except when the victor has a special interest in changing it.

If in the foregoing no attention has been paid to moral factors, it is because we are concerned here, not with ethics, but with the principles and practices of war. Most talk about the ethics of war, as a matter of fact, is either hypocrisy or buncombe. There may be a just war, but there is no war which is ethically conducted. Proof of this is readily seen in the wholesale violation of the rules of war during hostilities and in the disregard of international agreements which hamper the activities of belligerents.

Likewise, in carrying warfare over into the peace the defeated belligerent is guided, not by ethics, but by his own interest. If this lies in compliance with the dictates of peace, he will bow down. If the chances of resistance, in whatever form, equal or outweigh the risks, he will resist, regardless of "treaty obligations," "international law," "the practices of civilized nations," or the demands of higher ethics.

This is thoroughly reprehensible. But it is very natural, and finds many precedents in history. However much we may abhor such a policy, to ignore its existence is mere idleness, and we deceive only ourselves if we pretend that nations nowadays are too advanced to follow it.

When we come to apply these principles to the situation in Europe today, we find that Germany's present policy dates back to March, 1918. Then, and then only, was the tide definitely turned against her and did it become clear to her leaders that, contrary to their expectations, the United States could and would serve as a boundless reservoir of man power and supplies for the Allies which would finally defeat Germany.

From that moment it was clearly to Germany's interest to save as much of her strength as she could, and at the same time to inflict all possible damage on her enemies. She thereupon began to fall back, devastating the occupied regions as she went, and sought to prepare the way for an armistice. War-weary as were the Allies, they could not consider stopping while Germany still occupied French soil. They therefore continued to exert full pressure on the retreating Germans. The nearer the German line came to the frontier, the more anxious were the Germans to end the fighting. Sentimental, commercial, political, and military reasons made it plain that they must at any cost prevent the Allies from invading German soil. At the same time they wanted to avoid losing more men than was necessary in checking the too hasty advance of the Allies towards the Franco-German frontier.

Finally the Armistice was signed. It imposed severe terms upon Germany, but she accepted, believing that she could so modify them at the Peace Conference as to make them more advantageous to her than would have been the armed invasion of her territory.

During the peace negotiations, however, it was clear that in this, as in every other important European peace conference, the terms would be dictated by the victors. Germany did what she could through appealing to the Allies separately to have the conditions ameliorated. At the same time she began driving

in wedges between her enemies. She saw that if she could isolate France and Belgium, both of which would stand on the policy of an eye for an eye, she would be in a powerful position to sabotage the peace treaty. Incidentally, she was the first to appreciate the terrible truth that in a war such as this one, no matter who won, the real victim was the country on whose territory had been the fighting.

Although she lost during the negotiations at Paris, except in so far as she persuaded Mr. Wilson and the American delegation to work (often unsuccessfully) on her behalf, she signed the Versailles Treaty under protest, and forthwith began to fight for its revision. She succeeded in having the claims against her reduced. Owing to the fundamental difference between British and French policies, she met with moderate success in splitting the Allies. She even found that she was strong enough to sabotage deliveries in kind and to attempt to delay payments which she had conceded were justified.

In the meantime, while proclaiming to the world her inability to pay reparations, she was renovating and improving her railroads, canals, and roads, and was rebuilding her merchant fleet and expanding and modernizing her factories. All available movable wealth was shipped out of the country where it could not be reached by the Allies, and she then proceeded to unload on credulous Americans and "neutrals" hundreds of millions of dollars of worthless paper marks. In short, while her enemies were working to repair the ruin caused by her troops she was preparing to start her economic life anew with all the advantages of an intact and up-to-date industrial plant.

Then came the Ruhr occupation. It was a crushing blow. It disorganized Germany's industrial plans and meant that if the Allies wished to hold it they would have Germany at their mercy. Obviously, Germany had to do what she could to counteract this stroke. She hoped to enlist England's aid in her passive resistance. Owing to the disapproval in England of the Ruhr occupation, she was now nearly able to effect the split between the Allies which she had so long sought. But as conditions became worse, she saw that her only hope was to accept the Franco-Belgian demands, and to drop resistance and resume work. In the meantime she sought to encourage the move for a committee of experts to look into her ability to pay.

The appointment of the Dawes committee was hailed by her as a godsend. Its conclusions were seen to be more favorable to Germany than anything heretofore proposed. She accepted them—under protest, of course—after seeking vainly to have them softened.

What of the future?

If her past policy is a criterion, she will do with the Dawes Plan just as she has done with the other conditions imposed upon her. So long as she cannot profitably escape its terms, she will carry them out. But the moment a chance appears to modify them, whether by negotiation, default, passive resistance, or bluff and bluster, she will do so. All means that may be successful which she can employ will be used by her to cut down the sums which she owes the Allies and to remove the restrictions under which she labors. She will use every opportunity to undermine the Versailles Treaty, on which rests the territorial settlement which has deprived her of parts of East Prussia and Silesia in the interest of Poland and the new states of Europe.

In other words, the war will continue until the Allies tire of it or until Germany believes that she has obtained as much as she can. Although ostensibly it is only a fight against the Versailles Treaty, it is in fact merely a continuation by other means of the armed conflict which stopped on November 11, 1918. Ger-

many, not having then received a crushing defeat, is doing everything in her power to escape the penalties imposed upon her. Until the Treaty of Versailles has been carried out or so changed that she has forced from the Allies all possible concessions, the war will not end in Europe.

The sword has again given way to diplomacy, but both are still servants of the same policy. Why cry "Peace, peace," when there is no peace?

Aircraft Versus Artillery

By CAPTAIN K. A. HENDRICK, C. A., O. R. C.

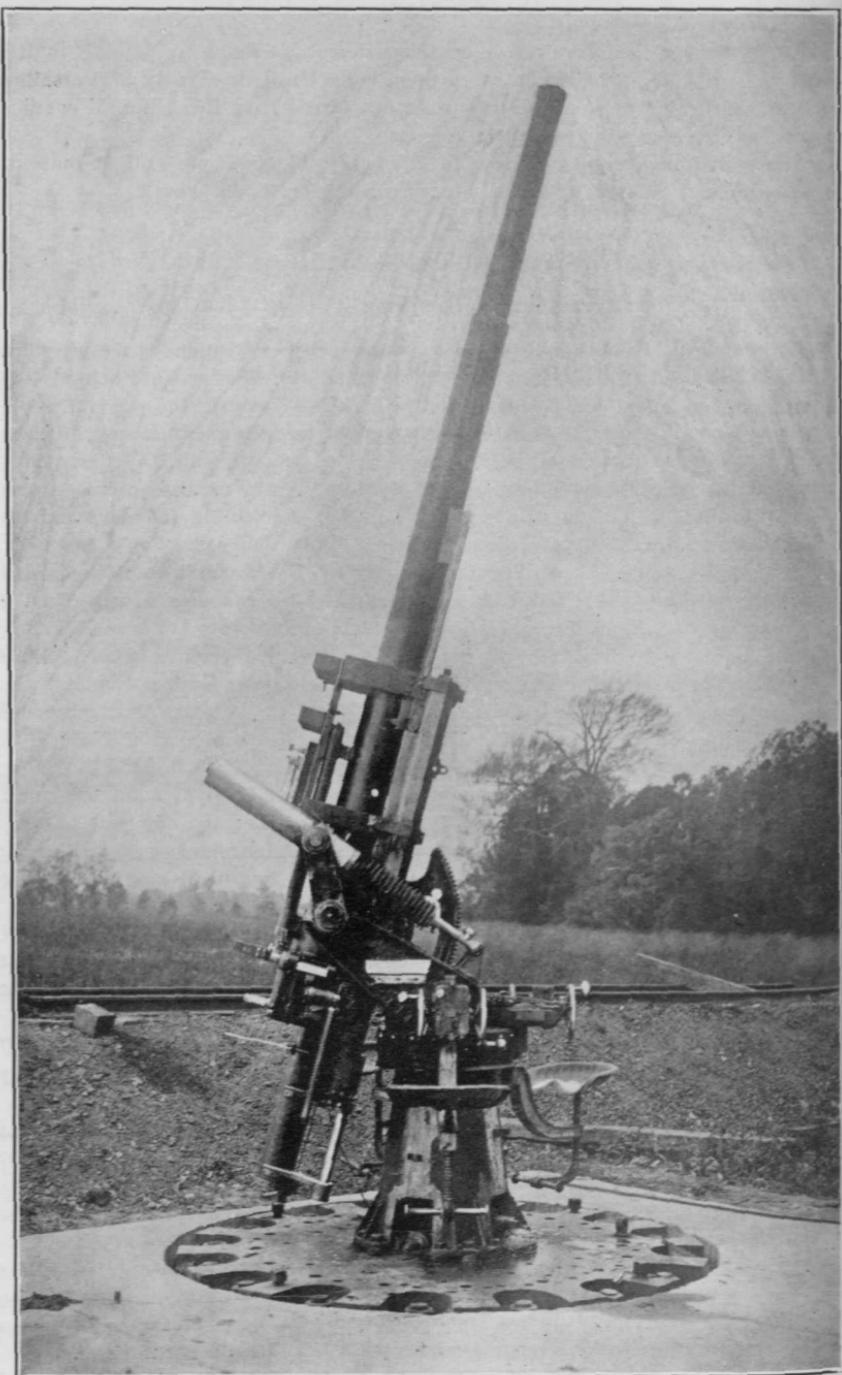
A great deal has been written on the superiority of airplanes over warships and heavy seacoast artillery. Bombing experiments have been and are being tried; and the popular effect has been instilled in a popular way in the popular mind. Ever new feats and conquests in the air augment the general tendency to place more and more faith in the airplane as a war-time weapon, which, they say, may replace artillery, infantry; indeed, render obsolete present methods of defense as well as of offense in land as well as in sea warfare. Perfecting of bombs and the ballistics of bomb trajectories goes on apace.

Statistics have been compiled on the city of Paris which was bombarded during the world war by Zeppelin, airplane, and *long range artillery*. During four years of war, Zeppelins and airplanes dropped on Paris 746 bombs, killing 266 persons and wounding 603, with a total casualty list, therefore, of 869. Since most of the air raids 1914-16 were directed by the Germans against England, the city of Paris was able effectively to organize their air defenses gradually and systematically. In 1918, on thirteen different raids by the Germans in which a total of 107 planes were employed, the Paris air defenses were so good that none of the raiders reached the city. Furthermore, out of a total of 483 planes sent out by the Germans against Paris in 1918 only 37 reached the city and 13 were brought to earth. As soon as raiders crossed the lines, telephonic messages to the antiaircraft batteries defending Paris caused them to be put in readiness to fire at the proper moment.

It is just this fundamental truth which is the severest limitation of aircraft as a conveyor for bombs or projectiles which is overlooked by the advocates of airplane and Zeppelin. Aircraft cannot travel faster than sound. The moment one passes overhead, the word is passed by telephone, telegraph or radio to the defense batteries which have been properly organized. The "Commence Firing" of these batteries is soon heard by the pilot aloft. The result is as shown by Paris statistics. The pilot faces about, if he can, to return to his origin.

The German long range gun which bombarded Paris, March 23rd to August 9, 1918, was active for 44 days during this period. It fired a total of 303 projectiles, 183 of which fell in Paris proper. It killed 258 people and wounded 620, a total casualty list of 878. It caused an exodus of people from the city in the number of hundreds of thousands. The moral effect of the weapon, due to its surprise, its comparative accuracy and regularity, was unquestionably of telling effect. The uncertainty as to where the projectile would strike "like a bolt from the blue" rendered almost useless bombproofs and dugouts. The evolution from Zeppelin to airplane to long range guns seems to have been a natural one.

In defense against the *long range guns*, a great deal of materiel, personnel and energy had to be directed to adequate counter battery work. The resulting human effect was a harassing degree of consternation which made itself felt at the front as well as in the immediate rear of the line, not to mention the city itself.



3-INCH ANTIACRAFT GUN, MODEL 1923-E

Mounted on fixed mount for test purposes only. For description see page 271,
COAST ARTILLERY JOURNAL, September, 1925

Antiaircraft Artillery

The antiaircraft artillery of the World War formed an important defense against aircraft. The value of these guns was measured not so much by the actual numbers of aircraft destroyed, as by their effectiveness in preventing aviators from carrying out their missions of raiding, bombing and observation.

It is, however, a matter of record that the effectiveness of the Allied antiaircraft artillery measured in terms of shots fired per plane destroyed increased three-fold during the last year of the war. This rapid increase in efficiency was due to the development of guns, ammunition, fire control, and the training of personnel.

The effectiveness of antiaircraft artillery can be greatly increased by construction of guns of higher muzzle velocities, better fuzes, and improved fire control instruments.

The 3-inch antiaircraft gun, Model 1923-E, has just been completed, and represents the best type of weapon produced up to this time. The gun, carriage, and trailer are very light, so that the unit possesses excellent mobility. The gun, which has a muzzle velocity of 2600 foot-seconds, is of higher power than the antiaircraft guns in general use during the war period. Further radical improvements in our antiaircraft artillery may be expected.—*Army Ordnance, November-December, 1924.*

Status of Coast Artillery Training Regulations

Published

435- 20 Emplacement and Tactical Employment of Coast Artillery in Harbor Defense.

435- 30 Tactical Employment of Antiaircraft Artillery (includes machine guns, guns, and searchlights).

435- 55 Analysis of Drill and Analysis and Reports of Target Practice.

435- 75 Searchlight Battery, Antiaircraft Artillery.

435- 85 Machine Gun Battery, Antiaircraft Artillery.

435- 90 Gun Battery, Antiaircraft Artillery.

435- 95 Service Battery, Antiaircraft Regiment.

435- 98 Separate Battalion, Antiaircraft Artillery.

435-100 Battalion Headquarters and Combat Train, Gun Battalion, Antiaircraft Artillery.

435-105 Battalion and Battalion Headquarters, Machine Gun Battalion, Antiaircraft Artillery.

435-110 Battalion (Gun) Antiaircraft Artillery.

435-115 Headquarters and Headquarters Battery, Antiaircraft Regiment.

435-120 Antiaircraft Regiment, Artillery.

435-160 Gunnery for Antiaircraft Artillery.

435-161 Identification of Aircraft.

435-205 Gun Drill, Fixed Mount, Antiaircraft Artillery.

435-210 Gunnery for Antiaircraft Machine Guns.

435-211 Antiaircraft Machine Gun Marksmanship.

435-220 The Battery Command (Fixed).

435-221 Fire Control and Position Finding.

435-250 Gun Drill, Mobile Mount, Antiaircraft Artillery.

435-255 Service of the Piece, 12-inch Mortar (Fixed Armament).

435-260 Service of the Piece, 12-inch Gun, Barbette Carriage.

435-265 Service of the Piece, 10-inch Guns (Disappearing Carriage).

435-270 Service of the Piece, 12 and 14-inch Guns (Disappearing Carriage).

435-290 The Fire Command.

435-295 The Fort Command.

435-300 The Coast Defense Command.

435-310 Examination for Gunners.

In Adjutant General's Office, Awaiting Approval

435- 25 Tactical Employment of Railway Artillery.

435- 26 Tactical Employment of Heavy Tractor Artillery (Coast Artillery).

435-185 Battery Command, Heavy Tractor Artillery (Coast Artillery).

435-222 Headquarters Battery, Coast Artillery Regiment (Harbor Defense).

435-225 Battery Command, Railway Artillery.

435-230 Service of the Piece, 12-inch Mortar, Railway.

435-280 Gunnery for Heavy Artillery.

435-266 Service of the Piece, 6-inch Gun, Disappearing Carriage.

435-267 Service of the Piece, 6-inch Gun, Pedestal Mount.

435-330 Tactical Use of Searchlights.

435-325 Orientation.

435- 56 The Schlorning Film and Tangent Scale.

435- 51 Mine and Submine Target Practice.

In Course of Preparation

435- 11 Type Programs and Schedules of Training Required Within a Coast Defense Command Upon Mobilization.

435- 15 Heavy Coast Artillery Materiel, General Characteristics.

435- 35 Tactical Employment of Trench Artillery.

435- 60 The Sound Ranging Battery.

435- 65 Sound Ranging Service (G. H. Q. Reserve).

435- 97 Headquarters Detachment and Combat Train, Separate Battalion, Antiaircraft Artillery.

435-135 The Battery Command, Trench Artillery.

435-140 Battalion, Trench Artillery.

435-145 Regiment, Trench Artillery.

435-146 Service Battery, Trench Artillery.

435-170 Battalion, Railway Artillery.

435-175 Regiment, Railway Artillery.

435-180 Brigade Headquarters and Brigade (G. H. Q. Reserve) Railway Artillery.

435-184 Service of the Piece, G.P.F. Heavy Tractor Artillery (Coast Artillery).

435-186 Brigade, Heavy Tractor Artillery (Coast Artillery).

435-188 Service Battery, Heavy Tractor Artillery (Coast Artillery).

435-189 Battalion, Heavy Tractor Artillery (Coast Artillery).

435-190 Regiment, Heavy Tractor Artillery (Coast Artillery).

435-226 Service of the Piece, 12-inch Guns (Railway).

435-227 Service of the Piece, 14-inch Guns (Railway).

435-231 Service of the Piece, 10-inch Guns (Railway).

435-234 Service of the Piece, 12-inch Gun, Railway Artillery (Battignolles).
(Sent to Ordnance for concurrence and comment).

435-235 Service of the Piece, 8-inch Guns (Railway).

435-240 Service Battery, Railway Artillery Regiment.

435-275 Service of the Piece, 16-inch Gun (Seacoast).

435-276 Service of the Piece, 16-inch Howitzer (Seacoast).

435-307 Coast Artillery Definitions.

435-315 The Mine Command.

The American Army

The Regular Army of the United States is 136,000 strong, and so limited by law, which fixes the enlisted strength at 125,000. The National Guard, which is now supported in part and also trained in part by the Federal Government, consists of a total of 163,000 men. These two together comprise the American land force, which is ready to take the field on short notice. Thus as far as the actual first and second lines are concerned the land defense of the United States is an army of 300,000 men. Behind this force is a body of 80,000 reserve officers, most of whom had some months of active service during the World War, and all of whom have qualified in the rudiments of some branch of the service. In an emergency they would be called upon to officer the draft army which would have to be called out. The national defense plan as now approved by the general staff calls for the assembling of 2,000,000 men in service at the end of nine months. In order to do this an officer reserve, together with the experienced enlisted reserve with World War experience, is essential. * * * The United States maintains the smallest army, counting its

regulars, guardsmen and reserves, of any of the great powers. France has 19 soldiers for each 1,000 of population, Russia has seven, Italy six, Great Britain and Japan five, Germany has 1.64 and the United States comes last with 1.24. The per capita cost to the people is in proportion. Every man, woman and child in France contributes in taxes \$22.33 a year to the support of the French Army. In the United States the per capita cost of the army is only \$2.20. These figures show greater contrast when it is realized that the United States army is better maintained and paid than other armies. On the basis of French army costs the cost of the American Army to the American people would probably be little more than \$1 per capita. The range in other countries is from one soldier to each \$90,000 of national wealth in Japan to one soldier for each \$250,000 of national wealth in Great Britain. Then comes the United States with one soldier to every \$2,500,000 of national wealth.

These figures reveal quite clearly the great military advantage of the United States due to its geographical position. It can hardly be invaded on short notice, as France can. It is also fortunate in other respects. There is no American militarist movement, as in Japan; no colonial problem, as in Great Britain, and no threatening uprising of the people, as in Russia. Nor has the United States a border to be kept under constant watch by a strong and alert army. The figures also reveal that there is less militarism in the United States than in any other country. The United States has, in fact, arrived at a sensible, economical and safe solution of its problem of national land defense.—*The Indianapolis News*.

Storage of Powder

During the past fiscal year a committee of ordnance experts on the storage of powder was appointed to study the subject of under-water storage of the reserves of smokeless powder. After careful consideration of all data pertaining to this problem, especially the experience of the French Government in connection with this class of storage, a report was submitted wherein the committee recommended that all reserves of bulk smokeless powder in excess of the amount required for new manufacture in the next two years should be stored under water, and that all smokeless powder propelling charges in excess of the number of projectiles of each caliber on hand, plus the manufacturing program for the next two years, be also stored under water. It has been found that powder deteriorates much more rapidly in dry storage than in wet. In fact, during the calendar year 1923, at the Charleston Ordnance Reserve Depot, two magazines and their contents were destroyed, presumably due to spontaneous combustion resulting from deterioration of the smokeless powder in storage in the magazine. Underwater storage of stocks of smokeless powder will, it is believed, serve to prolong the life of the powder, and postpone the day on which it will have to be replaced by new manufacture. In addition, powder in dry storage requires careful surveillance, with the resulting expense of conducting numerous and detailed surveillance tests from time to time of samples of the powder, maintaining the magazines in which the powder is stored, plowing fire-breaks around the magazine to prevent fire hazards, etc. If the reserves of smokeless powder are stored under water this expense will be avoided, resulting in a continuous saving to the government each year. In time these accumulated savings will exceed the actual cost of placing this powder in wet storage, in addition to the indirect saving which will be attained from the prolongation of the life of the powder.—*Annual Report of the Chief of Ordnance*.

Improvements In Infantry Weapons Since The World War

By MAJOR W. R. SCOTT, *Infantry*

Before the World War the American Infantryman was armed with rifle and bayonet. Selected men were armed with the pistol. Each Infantry regiment included a platoon armed with light machine guns fired from a bipod. This armament, with the exception of machine guns, had been standard Infantry armament for many years and through many wars.

The American military rifle, model of 1903, had been for years accepted as the best of its kind.

In arming our Infantry for the World War, we held to our service pistol, we adopted a new type of service rifle for issue to all but the Regular Army divisions, and we replaced our machine guns with a heavier model. The adoption of a new type of rifle was made necessary by the fact that our factories had not the tools to produce the model 1903 rifle in quantity. Both rifles used the same type of ammunition. We added also to our armament, automatic rifles, rifle grenades, hand grenades, 37-mm. guns, Stokes mortars, heavy tanks and light tanks. Of these, the rifle and bayonet are still the mainstay of the individual Infantryman, the other weapons, with the exception of the grenades, pistol and the automatic rifle, being taken care of in separate units in Infantry organizations. The notable exception among these weapons, the automatic rifle, has been substituted for one rifle in eight; pistols have replaced rifles where the Infantryman's duties prevent his using the latter weapon.

Up to the time when we emerged from the World War few attempts had been made to improve our weapons of pre-war pattern or those adopted during the war. Quantity production prevented changing of designs. The rifles, bayonets and grenades made in America from European designs, the machine guns, automatic rifles and pistols designed and made in America, the 37-mm. guns and Stokes mortars designed and made in Europe, the tanks made some in European designs; all were needed so badly in quantity that no delay could be chanced by changing designs.

When the World War ended, however, many of these weapons had developed serious defects, or deficiencies in combat, which pressed for correction. The War Department, therefore, began the study of improving this equipment for future manufacture. This study is still in progress. It must be understood that it is seldom worth while to alter equipment, except in a minor way; it has been found in the Army as well as in commercial life more economical to scrap old equipment or to use it to its limit, going then to improved equipment, than to call in, alter and reissue old equipment. Improvements already made can be briefly summarized as follows:

Rifle and Bayonet.—The supplies of model 1917 "Enfield" rifle and bayonet were placed in storage. The model 1903 "Springfield" rifle and bayonet were taken again as standard and issued to the service. A pistol grip rifle stock has been tested and approved, and, after a brief further test, will probably be adopted in some form.

The War Department has inaugurated more careful processes in the manufacture of the rifle which insure smoother bolt and trigger action and easier cartridge case extraction. Tests are now current with experimental front sights with a view of improving this feature. The rear sight has been subjected to exhaustive tests and as a result the peep aperture has been enlarged; tests of receiver sights are not yet finished.

The rifle is developing also in the direction of a semi-automatic rifle not exceeding the service rifle in weight and equal to it ballistically. Several experimental models of different types of these weapons have been made, but no extended tests have been carried out. There are now two types of promise, both of which will probably be given service tests within the next two years.

The greatest noticeable improvement in the rifle is in its accuracy. This, however, is probably due more to improved ammunition than to improvements in the rifle. The Army is still using war stocks of ammunition for its training, but the ammunition made in War Department arsenals for special rifle matches and for tests is continually improving. It is possible that when the replacement of our stocks of rifle ammunition begins we will go to an entirely new type with a gilding metal, boat-tail bullet about 13 per cent heavier than the present cupro nickel flat base bullet, and with greatly increased range and accuracy over the present service type.

Machine Gun and Automatic Rifle.—It speaks well for the ability of the designer of these weapons, Mr. Browning, that the improvements which have been made on them are of a minor nature only, chiefly in connection with the accessories such as the sights, the supports and the cooling systems. An experimental bipod for the automatic rifle is under consideration and designs are now being made for an improved tripod for the machine gun.

Stokes Mortar.—This weapon, adopted from the British, is of such limited range and accuracy than an entirely new weapon has been felt necessary to replace it. The War Department has therefore built two experimental rifled mortars, mounted on wheels. They are of 75 millimeters and 2.24 inches in caliber. Their range is about 1800 yards; more than double that of the stokes. It is expected that they will be extremely accurate up to that range and that one of them will be selected to replace the stokes mortar.

37-mm. Gun.—This gun, adopted from the French, is extremely accurate, simple and efficient. It does not, however, give sufficient armor penetration to be effective against tanks. An improved model has therefore been made which will be tested soon. Its range and armor penetration are greater than those of the service model. It is possible that this experimental model or modification of it will supplant the service model.

Grenades.—The rifle grenade, adopted from the French, has such limited range and danger radius and is so inaccurate that it is of little value. The hand grenade, adopted from the British, is also unsatisfactory, being uncertain in its action. The War Department is now engaged in the design of a combination rifle and hand grenade to overcome these defects.

Tanks.—Two types of tanks are now in use in our service, the British Mark VIII heavy tank and the French Renault light tank. These tanks are lacking in speed, maneuvering ability and gun power; they have various weaknesses of design and operation. Two experimental tanks of intermediate weight have been built to overcome these defects. The results, while not wholly satisfactory, have been a great advance in tank development. Further designs are now under way of a tank that will more nearly meet our requirements.

Altogether, it is believed that the experience of war and the experiments and tests continued since, have developed the weak points of our Infantry weapons and have indicated definite and reasonable requirements for ideal types. There is no doubt that within a few years improved designs of nearly every type of Infantry weapon will have been approved for manufacture or filed for use in case we should go to quantity production.

Training The Army In 1925

The War Department has issued instructions for training the Regular Army, National Guard, Organized Reserves, Reserve Officers' Training Corps, and the members of the Citizen's Military Training Camps during the training year 1925. These instructions are contained in a training directive and in General Order No. 35, Notes on Training.

The former has been issued to the higher commanders and prescribes for the corps areas the results only that are to be attained and gives some general instructions on the preparation of training plans, allowing each corps area commander to attain his training objective in accordance with local conditions. Training is thus decentralized geographically. The notes on training were issued to the service at large and go into such necessary details as will assist commanding officers of all grades in planning the training of their units. All training is based on the requirements of the War Department General Mobilization Plan.

The methods for organizing the year's training are gone into in considerable detail. Camp commanders are to be designated early in the year so that the estimates for personnel and supplies and the plans for training may be submitted by March 1, 1925. The schedules for the training camps are to be completed two months before the camps start and the set-up of each camp will be tried out before the citizen trainees arrive.

Various methods of training are presented so as to reduce the operating overhead of the camps and train the citizen components without the necessity of utilizing the entire Regular Army. Specific missions are to be prescribed for each unit and training is to be so planned that those Regular Army units that will carry the training camps will not spend more than three months in camp, two months of which will be taken up in instruction duties.

Training is to specialize on the development of leadership, combat training in the smaller units and in the application in the field of the principles learned in the battles of the World War. This training for both Regular Army and National Guard is to be checked up and tested by inspections so as to get all officers to thinking of battle methods and not merely according to the methods of the drill manuals.

The National Guard is to plan its training during the armory period so as not to duplicate its work during camp, but to progress to that kind of training that cannot be given at home.

All units are urged to start a year-round recruiting plan so that companies will secure two or three recruits per month and thus not come to camp filled up with recruits to such an extent that training as a combat unit is impossible. The completion of preliminary rifle practice before arrival at camp, instruction of cooks and mess sergeants, and the limitation of purely military instruction at camp to six hours daily are among other subjects brought out.

The training of the Organized Reserves is placed on a stable basis. A new, more comprehensive and progressive system is put into effect. The reserves are to be given unit training so as to insure the organization and functioning of regiments and smaller units and the production of homogenous teams commanded, led and administered by their respective commanders and staffs. Different methods of training will be used to attain this end. For actual command and practical battle training, reserve units will be associated with Regular Army units, not only during summer camps, but throughout the year in garrison and on the march to and from camps. For actual command and practical mobilization training reserve units will be trained at Citizens' Military Training Camps.

For command and practical training of the unit cadres, organized reserve units will be trained at general or local unit camps. These methods will be used during 15-day periods of active-duty training scheduled at such times as will be most convenient for the majority of the members of each reserve unit. A roster of unit training will be kept so that on successive years the reserve units may utilize different methods of training.

Training on inactive-duty status will be kept up by correspondence schools, unit schools at home stations, visits to Regular Army stations, conferences and terrain exercises so as to prepare the unit for its coming active duty training tour.

Units and individuals will be selected and ordered through military channels to active-duty training. At least four months advance notice will be given. If urgent reasons exist that will make compliance with the order a personal hardship to any reserve officer, exemption may be obtained by applying through the officers' regimental commander to corps area headquarters.

In the Reserve Officers' Training Corps, senior basic camps for Air Service units are authorized in addition to the camps held this year. Members of junior units may attend senior basic camps after completing two years' military training at their schools.

In training the C. M. T. C. new and more interesting methods of instruction in citizenship and physical development will be put into effect. All Regular Army officers are required to prepare themselves for imparting instruction in citizenship, which will be featured as the most important part of the training. White and Blue candidates will be utilized in the training and administration of the student organizations. In addition to the large central camps, numerous small camps will be held at Regular Army posts so as to cut down the cost of transportation.

Throughout these training plans the War Department's efforts to effect economies in personnel, supplies, and transportation are very much in evidence.

Secretary Weeks' Ten Year Program

Secretary Weeks' recommendation that a comprehensive ten-year program for the national defense forces replace the outward year-to-year method of handling related problems, is the foremost feature of his annual report.

As the Secretary points out, time will have eliminated the majority of Great War veterans, as effective and experienced reserves, a decade hence; and then the navy-limitation treaty will expire. Therefore, he urges a plan whereby the entire military establishment—both permanent and non-permanent forces—shall be rehabilitated by 1934, and that slipshod treatment of these problems end at once.

Mr. Weeks does not ask Congress to appropriate a cent more than is needed to maintain the minimum number of officers and enlisted men in service, and to keep barracks, quarters, equipment and other properties from wasteful deterioration. That minimum—based on the need that military projects be highly practical—the Secretary fixes at 13,000 commissioned officers and 150,000 enlisted men for the Regular Army.

The Regulars are, and must remain, the nucleus for the Nation's manpower in emergency. Scant appropriations now compel the War Department to hold down the enlisted strength to 118,750 men, including 7000 Philippine Scouts. The latter are unavailable for general military purposes; their duties are peculiar and do not contemplate that the organizations shall be used beyond the Philippines.

The Regular Army thus is below the figure which Congress set in the appropriation bill for the fiscal year 1923-24. At that time all save a few professional extreme pacifists conceded that the permanent forces should stand at 12,000 officers and 125,000 enlisted men as an irreducible minimum—marking the danger line. That figure did not include the Philippine Scouts, rightly considered as local defense troops in a distant possession.

It is time to look ahead—to rehabilitate not only the Regular Army, but also the National Guard, the Organized Reserves, the Reserve Officers' Training Corps and the Citizens' Military Training Camps. In 1934 the Regulars should have 13,000 officers and 150,000 enlisted men—which force, so far as may be foreseen, would be enough to garrison the stations beyond the seas and to maintain a training nucleus at home.

The War Department contemplates an increase in the National Guard component, from 176,000—the present recognized strength—to 250,000 at that time, and it also would expand the other non-permanent groups as conditions justify. In that way the military establishment would not become lop-sided; one part would not suffer to help another.

This plan strictly follows the National Defense Act (1920), and Congress should approve it. The scheme has the merit of simplicity, judicious economy and common sense. The fear of a standing army, which arose in England and its colonies during the struggle between James II and parliament (1688-89) and later obsessed many Americans, should give way before the new Army of the United States—mostly citizen soldiers.—*San Antonio Express*.

Smoke Screen Used Two Centuries Ago

A German historian directs attention to the fact that smoke screens by no means originated in the World War. A full 200 years earlier Charles XII, the remarkable soldier-king of Sweden, employed similar measures when he crossed the River Dvina in the Great Northern War, preliminary to his attack on Riga. An old account runs:

"Since he had observed that the wind blew from the north, where he was, toward the south, when the enemy was encamped, he had great masses of damp straw set on fire, causing a thick smoke which hid his troops as they rowed across the river. Boats filled with burning damp straw also were sent ahead of his troops, hiding them from the view of the Saxons, for whom it was impossible to see whether the King was crossing or not.

"In a quarter of an hour he landed on the other bank, brought his artillery into position and formed his lines before the enemy could oppose him."—From *Evening Sun, Baltimore, Maryland*.

Advice From General Pershing

In his final report as Chief of Staff, General John J. Pershing has rendered his final service as an army officer, except such incidental service as he may happen to render in his status of retirement. It is not desirable to extend the age limit of retirement or extend it in individual cases so as to postpone desired promotions of juniors. Nor does General Pershing desire it. But, considering the physical and mental vigor of General Pershing and his obvious desire to continue work some way may be found for the further utilization of his competency and experience.

His final report gives advice we shall heed if we are wise. As we have heretofore invariably been foolish in our peace-time policies for defense, we have no reason that occurs to us to expect any different course now. Our folly in dealing

with our army and navy has cost us billions of dollars and multitudes of lives. Except in our magnificent personnel on land and sea our showing in the Great War was not at all to our credit.

That we may have an army adequate to care for our garrisons and coast fortifications, maintain order where it is our duty to maintain it, with a surplus adequate to give training to the second and third lines of defense, General Pershing says that there is required a regular army of 150,000 enlisted men and 13,000 officers. The Secretary of War asks a corresponding increase in strength of the national guard.

Our coast defenses should be put in first-rate condition and properly maintained, the air service should be greatly increased and improved, and a reasonable reserve stock of war material be kept on hand. Secretary of War Weeks is in entire agreement with General Pershing and his report adds many details.—*San Francisco Chronicle*.

A Vital Subject

[REPRINTED FROM *Army Ordnance*, NOVEMBER-DECEMBER, 1924.]

In his report to the President for the year 1924, the Secretary of War has this to say on the important topic, "Reserve Ammunition":

While it is true that ample stores of ammunition have been retained since the war as a reserve in conformity with sound military policy as provided by congressional action, these stocks cannot last indefinitely. They are subject to depletion of two sorts. They are reduced year by year as a result of the normal amount of firing carried on in target practice to insure training in marksmanship. They are likewise reduced by normal deterioration. In fact, even if there were no target practice, the ammunition reserve would all be unsafe in 1939, as the ordnance experts give 20 years as the safe life of the artillery ammunition manufactured during the war. The fundamental requirement is to maintain a proper war reserve. The next question is to determine the most economical method of retaining that reserve in an efficient condition.

* * * * *

The reserves should be kept at a minimum, for we must be economical; nor can we build them up immediately, for we must distribute our expenses. But it is essential that they be built up to normal size at a nominal rate if our forces are to function efficiently when they enter a theater of active operations.

The replenishment of the ammunition reserve should be commenced in the near future.

Air Mail Beacons

The Sperry Gyroscope Company has placed one of its Air Mail Beacons on the roof of the Sperry Building in Brooklyn. The beacon will be operated each evening from 5 to 8 o'clock and will rotate its beam around the horizon three times per minute in the same manner that similar beacons are being used through the middle zone of the Transcontinental Air Mail route.

The Air Mail aviators, having now had about five months experience flying every night with these beacons as a guide, report that during average weather conditions they pick up the beacons from 100 miles distance. The intensity of the beam is 500,000,000 candle power and were it not for the fact of the earth's curvature the aviators would be able, in clear weather, to see the beacon at even greater distances. The Air Mail pilots fly usually at an altitude from 2000 to 4000 feet and their horizon is, therefore, about 100 miles. On one occasion where the pilot flew to an altitude of 8000 feet, he picked up the beacon at 130 miles. The actual limit of the penetration of this powerful beam is, therefore, not yet known, since the higher the plane flies the farther the beam can be seen.

COAST ARTILLERY BOARD NOTES

Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed may be sent direct to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration.—R. S. ABERNETHY, Col., C. A. C., President Coast Artillery Board.

New Projects Initiated During the Month of December

Project No. 311, Test of Type B. B.-29 Storage Batteries.—Three (3) Type B. B.-29, 4-volt storage batteries were received from the Chief Signal Officer on November 29, 1924, for test by the Coast Artillery Board. In the letter of instructions from the Chief Signal Officer covering the type B. B.-29 storage batteries it was pointed out that certain possible defects might be remedied by the following modifications if considered necessary:

- a. Increase size of terminal screws should they appear too small.
- b. Replace rubber covered flexible leads by rubber covered lead straps.
- c. Place name plate on container instead of cover.
- d. Improve method of attaching cover. Three methods are possible:
 - (1) As in the sample where the cover is detached from the container and held on by spring catches on the cover fitting over projecting lugs on the container.
 - (2) Hinging the cover to the container.
 - (3) Attaching the cover to the carrying strap by passing the strap through cleats on the cover.

The Board was instructed to make physical tests only, and if possible to complete the tests in ten days. Complete report of tests will be published at a later date.

Project No. 312, Miniature Antiaircraft Range.—Two articles on "Eye Shooting Against Aircraft," used and a description of a Miniature Antiaircraft Range to train officers in eye shooting were forwarded to the Coast Artillery Board by the Chief of Coast Artillery directing a study be made of the possibility of eye shooting and the desirability of erecting a miniature range.

At conference between members of the Coast Artillery Board and officers of the 61st Artillery, C. A. C., (A.A.), the consensus of opinion appeared to be that eye shooting is not effective and that the benefit derived from a miniature range would not be commensurate with the cost. An emergency method of Antiaircraft Fire Control is required, but it is believed that the method of handling emergency firing laid down in the mimeograph of the Coast Artillery School, "An Emergency Method of Fire Control for Antiaircraft Artillery," offers more possibilities and gives the battery commander emergency data of greater value than he could

possibly estimate. It is thought that at the outbreak of war our Antiaircraft officers will not have the time to be trained in eye shooting.

The Board recommended that:

- a. A Miniature range be not constructed.
- b. Battery commanders be not trained in eye shooting where estimation of data alone is to be used.
- c. A system for emergency conditions along the lines of the mimeograph of the Coast Artillery School be used where this type of firing is required.

Project No. 313, Pamphlet on Cloke Plotting and Relocating Board.—

A copy of a proposed pamphlet of instructions on the description, operation, and use of the Cloke Plotting and Relocating Board was forwarded to the Board for study and comment.

Project No. 314, Azimuth and Elevation Indicator for Electric Control of Antiaircraft Searchlights.— Investigations conducted by the Engineer Board, Fort Humphries, Va., have indicated that an adaptation of the "Repeat Back" system now used in connection with the Gyro-Compass and manufactured by the Sperry Gyroscope Company may be practicable for use as a "Repeat Back" system for a 60-inch Light Weight Barrel Type Antiaircraft Searchlight.

The system consists of two transmitters, one located on the azimuth ring gear, and one located on the elevation segment. Each transmitter would weigh approximately ten pounds. The receiver would consist of a suitable box containing two small motors approximately 100 watts each, geared to dials, or pointers and scale. An additional nine conductor cable would be necessary. Seven wires are necessary to operate the system and the additional wires may be used for a telephone. Orientation would be accomplished by the telephone. One mile of cable is practicable. The system would operate in steps of ten minute of arc. The elevation transmitter would require the installation of additional slip rings in the base of the searchlight.

The above was referred to the Coast Artillery Board for a list of requirements for a "Repeat Back" system for Antiaircraft Searchlights, and an opinion as to whether or not the "Repeat Back" system mentioned above would meet their requirements.

Project No. 315, Comments on Section XIV, T. R. 430-85, High Burst Ranging.— Section XIV, T. R. 430-85, High Burst Ranging, was forwarded to the Coast Artillery Board by the Chief of Coast Artillery; comments and recommendations were requested. Certain apparent errors were noted in the manuscript of the proposed T. R., and corrections suggested as were minor changes in the method of high burst ranging believed desirable to fit this section of the T. R. 430-85 to the conditions of the Coast Artillery Service.

Completed Projects

Project No. 242, Communication System for Mobile Seacoast Artillery for Firing on Moving Naval Targets.—

I.—HISTORY OF THE PROJECT

1. In its report on Project No. 116, "Fire Control System for National Guard," the Coast Artillery Board recommended the issue to all National Guard mobile Coast Artillery batteries of certain position finding equipment to enable these batteries to fire against moving naval targets, and in its report on Project

No. 75, "Fire Control System for 155-mm. Guns," the Board recommended the procedure to be followed in training the personnel of tractor-drawn batteries for firing at moving targets. In conjunction with these two projects the Board undertook a study to determine the fire control communication system necessary to enable both railway and tractor-drawn artillery to conduct fire on moving naval targets in the manner discussed in the aforementioned projects.

II.—DISCUSSION

2. For firing on moving naval targets the fire control equipment necessary for mobile artillery is practically identical with that employed by fixed artillery. The communication system is, however, somewhat affected by the mobility of the railway and tractor artillery. Railway artillery fire control communication systems are not materially limited by considerations of weight except that line material should be of moderate weight, at least, in order that fire control lines may be established rapidly. Tractor artillery fire control communication systems are considerably limited as to weight in transport inasmuch as transportation is by truck. Line material and other components of the system should be restricted to the minimum practicable weight and size.

3. The tactical situation in which mobile seacoast artillery is to be employed will frequently call for rapid installation of communication lines. Such a requirement will preclude the use of multiple conductor cable, such as is used in standard fixed batteries, and twisted pair laid on the ground will have to be utilized. If the situation permits, these lines will later be strung on poles or trees or placed in shallow trenches. Multiple conductor cable is unsuitable for mobile seacoast artillery not only because of the time required to install it, but on account of its weight as well.

4. The feature of the fixed battery fire control system most unsuitable for use by mobile artillery is the time interval signal system. This system will not operate satisfactorily on long lines or on lines of high resistance and the power equipment required for its operation is heavy and cumbersome. It has been proved by test in 155-mm. organizations that the difficulties inherent in the bell time interval signal system can be avoided by introducing a buzzer sound into the observing station telephone lines. This can be accomplished very simply with standard materiel. In its report on Project No. 200, Test of Motor and Clock Driven T. I. Apparatus for Mobile Artillery Units, the Board recommended for adoption as standard, a motor driven time interval and buzzer mechanism for introducing a buzzer tone into telephone lines and for transmitting a buzzer firing signal to the guns. This mechanism is well adapted for use in future installations of fixed defenses, particularly where long lines or lines of high resistance may be necessary.

5. The common battery telephone system is, in general, unsatisfactory for mobile artillery. Some of the lines that will be employed by mobile artillery are too long to operate efficiently on the common battery system. Some commercial companies have adopted a distance of five miles from the central battery as the distance not to be exceeded for common battery operation. This results in a possible length of line, phone to phone, of ten miles. Such commercial operation is generally under the most favorable conditions, whereas artillery fire control phones receive much harder usage than commercial phones, frequently being used continuously for several hours, and are operated over lines which at times will have been laid under any but favorable conditions for operation on common battery. Also, common battery systems require more equipment, especially for power, than do local battery systems.

6. The most serious objection to the local battery telephone system for mobile artillery is the necessity for having batteries at each phone. In the case of dry batteries, a large supply would have to be carried on hand. If storage batteries should be used, the difficulty of getting them to distant stations is a serious drawback. However, this difficulty is not insurmountable and all things considered the advantages in the use of the local battery system for mobile artillery far outweigh this one serious objection. It is believed, moreover, that a long-life light-weight storage battery suitable for a local battery telephone system in the field can be obtained with little difficulty. Furthermore, it is believed that if advantage be taken of recent improvements and refinement in commercial communications materiel by replacing the present somewhat out-of-date communication equipment, particularly receivers and transmitters, now in the hands of mobile artillery units, with the better material now obtainable it is believed that the local battery system for mobile artillery communications will prove to be thoroughly satisfactory.

7. The communication equipment listed in Table of Basic Allowances of Equipment, Special for Coast Artillery Troops, Table IV-G, Circular 373, War Department, October 26, 1920, is insufficient for mobile artillery fire control installations for firing at moving targets. The necessity for increased equipment will be shown in the following paragraph. The amount of equipment to be recommended has been kept down to the minimum required for firing at moving targets.

8. In general mobile artillery emplaced for firing on moving naval targets, whether within or adjacent to coast defenses, or in a position in which there is no fixed armament, may be expected to organize for such fire in conformity with fixed defenses. In other words, depending upon the size of the force employed, mobile artillery will organize battery, fire, and fort commands. The basis for the equipment to be recommended in the following paragraphs is the battalion of mobile artillery organized as a fire command containing two battery commands, with base line communications interchangeable.

9. The battery command will require the following lines of communication:

- (1) From B' station to plotting station.
- (2) From S' (Spotter at B') to plotting station.
- (3) From B" station to plotting station.
- (4) From S" (Spotter at B") to plotting station.
- (5) From range or elevation board in plotting station (No. 1 data phone) to guns. (Phones at guns to be in parallel). Maximum of 2 lines depending on location of guns.
- (6) From azimuth or deflection board in plotting station (No. 2 data phone) to guns. (Phones at guns to be in parallel). Maximum of 2 lines depending upon location of guns.
- (7) From P. C. to switchboard station.
- (8) From Battery executive to switchboard station.
- (9) From Plotting Room to switchboard station.
- (10) From B' arm phone in plotting station to switchboard station.
- (11) From B" arm phone in plotting station to switchboard station.
- (12) From self-contained base range finder to switchboard station.
- (13) From switchboard station to battalion headquarters—3 lines.
- (14) A buzzer firing signal line from plotting station to guns. Buzzers or howlers at guns to be in parallel.

10. The foregoing communication lines are based on the following considerations:

a. The primary station generally will be located in fairly close proximity to the battery. Hence lines from plotting room to B" will generally be short—not over 500 to 1000 yards.

b. In general spotters will be located in the B' and B" stations or so close thereto that the observing line and spotter line to either station will be of practically the same length. Such an arrangement admits of the simultaneous laying of these two lines from plotting room to each station.

c. The secondary station will be located in general not over 3000 yards from the plotting room. As in the case of the primary station, the observing line and the spotting line can be laid simultaneously.

d. In every seacoast fire control installation it is necessary that the battery commander have means of communicating with the B' and B" observers, primarily for the purpose of placing both of them on the same target. In fixed battery installations a separate line to both stations, known as the Intelligence Line, is ordinarily provided for this purpose. To obviate the necessity of a separate B. C. Intelligence Line in mobile seacoast artillery installation it is proposed that the B' reader's phone and the B' armsetter's phone be connected through a type BD-9 switchboard (4 line) in the B. C. station, or P. C., and that the B" reader and the B" armsetter be connected in like manner; also that the observer in each station be equipped with a headset connected in parallel with the reader's headset. By means of the monocord operator's set of the 4-line switchboard in the B. C. station, B. C. can then plug in to either or both of the observing station-plotting room lines and thus communicate with the observers.

e. The spotter lines can be directly connected to their respective phones without going through a switchboard.

f. Lines of communication for mobile artillery will generally be more vulnerable to enemy fire than corresponding lines in fixed batteries. Interruption to communication due to such vulnerability may be minimized by careful laying of the lines and by running additional lines. The tactical situation, however, may be such as to necessitate the employment of a battery's communications the moment they are installed. Interruption of the communications to base end stations at such time may be fraught with grave consequences. For these reasons the Board proposes that the base end station communications within the battalion of mobile seacoast artillery be interchangeable and that the battalion commander in his capacity of fire commander have his own base line, which can be placed at the disposal of either or both batteries as circumstances dictate. To obtain this interchangeability the lines from the B' armsetter and the B" armsetter in the plotting room should be connected to two units of the battery switchboard. These two lines would be in parallel with the two armsetter lines to the 4-line switchboard in the B. C. station. Two other units of the battery switchboard should be available for connecting to two lines running to the battalion switchboard. These are two of the three lines listed in (9) above. By means of a similar connection at the battalion switchboard data from the battalion baseline can be supplied to either or both batteries or data from one battery can be supplied to the other. In the event of continued use of the battalion baseline by a battery, an emergency connection should be made from the battery firing buzzers to the battalion time interval mechanism.

g. The normal emplacement of the guns of a tractor-drawn battery should be such that data calculated for the directing gun or directing point, will apply to the entire battery. In such a case two gun-data phone lines from the plotting room to the guns are required; one for range or elevation, and one for azimuth or deflection. The tactical situation, or the terrain, however, may necessitate the location of tractor-drawn guns in two groups so widely separated that relocated data for each group may be necessary. Moreover, in the case of railway artillery it will generally be the case that relocated data will be required for each gun. For such case, four data lines from the plotting room instead of two will be required. Supply of communication equipment for both tractor-drawn and railway artillery should be based upon these dispositions.

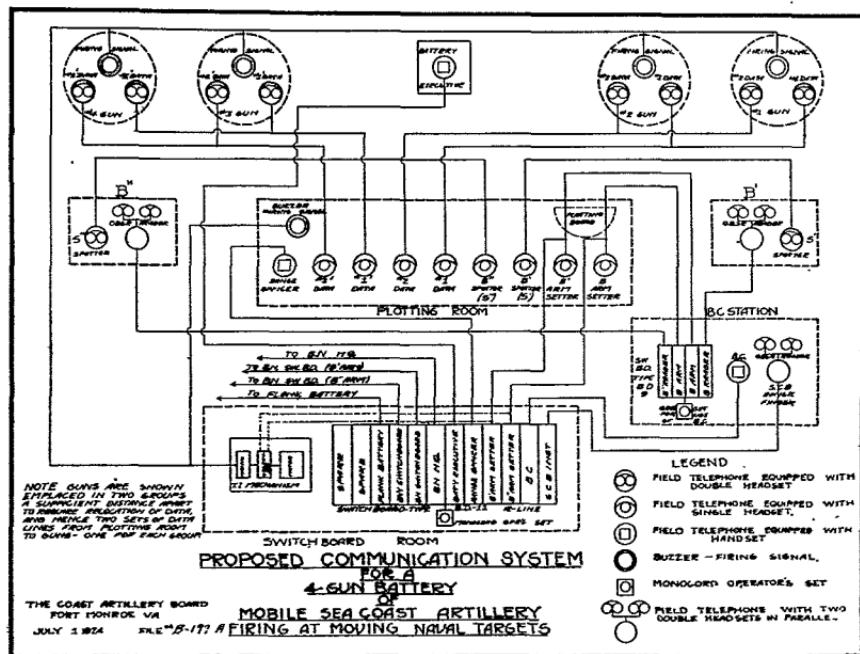


FIG. 1

h. Other phone lines listed in paragraph 9 are the normal lines of communication within the battery command.

i. The buzzer firing signal line normally will run from the T. I. Apparatus in the switchboard room to the plotting room and guns. These will be comparatively short lines. A description of the T. I. Apparatus and its use will be found in report on Coast Artillery Board Project No. 200. The observing T. I. signal connection is made to the armsetter lines in the switchboard room.

11. Telephone terminal blocks, 3 post, should be provided for use in the plotting station to reduce confusion and inconvenience incident to so many wires entering it.

12. A schematic diagram of the proposed communication system of a 4-gun battery of mobile seacoast artillery is shown in Figure 1.

13. In order that the battalion may function as a Fire Command in firing at moving naval targets and that all base lines within the fire command may be interchangeable the scheme of communications shown in Figure 2 is proposed.

This scheme provides for the utilization by either or both of the batteries or by the fire commander of any of three base lines that will normally be established in the fire command. Such base lines are as follows: The Fire Command base line; "A" battery base line and "B" battery base line. The considerations which, in the past, have led to the establishment of a fire commander's base line in fixed defenses apply with even greater weight in the case of mobile seacoast artillery, principally because of the greater vulnerability of its lines of communication, with the consequent necessity for having available other base lines in case a battery's own line is put out of commission.

14. Since either or both batteries of the battalion may be expected to utilize the fire commander's base line as the exigencies of the situation demand, the fire

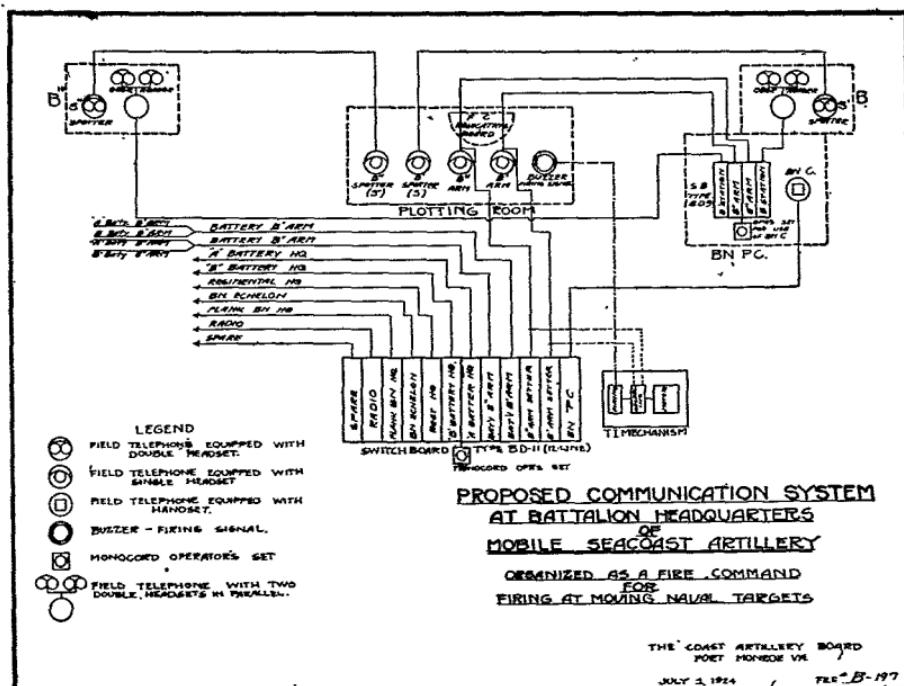


FIG. 2

commander should be equipped with a spotting system identical in every respect with the battery spotting system. The F. C. plotting room would then require only a spotting device and a relocating board, with two telephone lines to each. These lines are the two lines to each observing-spotting station. The battalion commander's station, or P. C., would be organized exactly as the B. C. station as described in paragraph 10 (a)-(e).

15. From the battalion switchboard lines would run as follows:

- To fire command station (Bn. P. C.)
- To B' armsetter and to B'' armsetter in plotting room (2 lines).
- Two sets of two lines in parallel, one branch of each running to the switchboard of each battery, where it can be connected to the lines to the B' armsetter and the B'' armsetter.
- Two lines, one to each battery P. C., through the respective battery switchboard.

e. The remaining units of the battalion switchboard would be utilized for the normal communications of the battalion, such as to Regimental Headquarters, to the flank battalion, and to other stations.

16. Since the fire command base line normally will be used by the F. C., independently of the batteries, the fire command equipment should include a T. I. mechanism. The T. I. mechanism to be recommended as standard provides a firing signal as well as an observing signal. A buzzer firing signal is shown therefore in the F. C. plotting room on Figure 2. This will normally be held in reserve for emergency use.

17. In a mobile seacoast artillery unit organized for firing on moving naval targets in accordance with the principles outlined in the foregoing paragraphs certain telephone operators will be in more or less exposed positions. Neither observing stations nor gun emplacements will have the protection that is provided in such places in fixed defenses. For efficient transmission and reception of data these telephone operators require a headset consisting of a breast transmitter and a double receiver, i.e., a receiver for both ears. In the plotting room telephone operators must have one ear uncovered for reception of data *viva voce*. All such operators will require a headset consisting of a breast transmitter and a single receiver. For all other telephone operators a handset (transmitter-receiver) will be satisfactory. The changes to be proposed in the equipment tables will include therefore the issue of double-receiver headsets and single-receiver headsets. Such headsets should be made up of the best materiel obtainable and should be on a par in efficiency with the best equipment in use by commercial telephone organizations. On field telephones to be equipped with these two types of headsets the handset may be omitted.

18. For installing the communication systems outlined in the foregoing paragraph the following equipment will be required:

FOR EACH BATTERY

- 30 Telephones, field, latest type (includes 4 spares).
- 2 Switchboards, Type BD-9 (4-line). (Includes 1 spare).
- 1 Switchboard, Type BD-11 (12-line), or 3 Type BD-9 as at present prescribed, making total of 4 in the battery.
- *18 Handsets, double-receiver breast transmitter (includes 2 spares).
- 10 Headsets; single-receiver breast transmitter (includes 2 spares).
- 5 Handsets, receiver-transmitter (includes 1 spare).
- 12 Terminal Blocks, telephone, 3 post.
- 1 Time Interval Apparatus, complete.
- 15 miles, wire, field; twisted pair, 11 strand, Type W.

FOR BATTALION HEADQUARTERS

- 13 Telephones, field, latest type (includes 2 spares).
- 2 Switchboards, Type BD-9, (4-line). (Includes 1 spare).
- 1 Switchboard, Type BD-11 (12-line).
- *8 Handsets, double-receiver breast transmitter (includes 2 spares).
- 6 Headsets, single-receiver breast transmitter (includes 2 spares).
- 3 Handsets, receiver-transmitter (includes 1 spare).
- 6 Terminal Blocks, telephone, 3 post.
- 1 Time Interval Apparatus, complete.
- 20 miles wire, field, twisted pair, 11 strand, Type W.

*These may include the 6 headsets, telephone, high efficiency with soft rubber ear caps, now listed in Tables of Equipment.

19. The equipment listed in paragraph 18, is based on a battalion comprising a battalion headquarters and two batteries of four guns each. In the case of a two-gun battery, the equipment listed in paragraph 18, would be reduced in amount for each battery as follows:

- 4 Telephones, field.
- 4 Headsets, double-receiver breast transmitter.

III—CONCLUSIONS

20. It is the opinion of the Board that the equipment listed in paragraph 18, is the minimum necessary to enable a battalion of mobile seacoast artillery composed of two four-gun batteries, either railway or tractor-drawn, to conduct an action against a moving naval target with maximum rate of fire and greatest efficiency, at the same time maintaining an interchangeability of base lines within the battalion.

IV—RECOMMENDATIONS

21. The Board therefore recommends:

a. That Circular No. 373, War Department, October 26, 1920, Basic Allowances of Equipment Special for Coast Artillery Troops, Table IV-G, Motor Drawn Brigades and Regiments, Amendment to Circular No. 152, War Department, 1920, for those motor drawn coast artillery organizations which may be employed against moving naval targets, be amended as follows:

Allowances to be changed

1. Telephones, type (latest)	(a) 30 per battery; 13 per battalion; 6 per regimental headquarters; 12 per brigade headquarters.
2. Switchboards, Signal Corps, Type BD-11 (4-line)	(a) 2 per battery and battalion headquarters.
3. Switchboards, Signal Corps, Type BD-11 (12-line)	(a) 1 per battery and battalion headquarters; 2 per regimental and brigade headquarters.
4. Wire, field, twisted pair, 11-strand Type W, miles	(a) 15 per battery; 20 per battalion and regimental headquarters; 35 per brigade headquarters.

Equipment to be Added

5. Headsets, double receiver, breast transmitter	(a) 18 per battery; 8 per battalion headquarters.
6. Headsets, single receiver, breast transmitter	(a) 10 per battery; 6 per battalion headquarters.
7. Time Interval Apparatus, complete	(a) 1 per battery and per battalion headquarters.
8. Terminal Blocks, telephone, 3 post	(a) 12 per battery and per battalion headquarters.

b. That Circular No. 21, War Department, January 25, 1921, Basic Allowance of Equipment Special for Coast Artillery Troops, Table IV-G, Railway Artillery, Supplementary to Circular No. 152, War Department, 1920, for those railway coast artillery organizations which may be employed against moving naval targets, be amended as follows:

Allowances to be changed

1. Switchboards, Signal Corps,
Type BD-11 (12-line) (a) 1 per battery; 2 per battalion, regimental and brigade headquarters.
2. Telephones, type (latest) (a) 30 per battery; 18 per battalion headquarters; 12 per regimental and brigade headquarters.
3. Time Interval apparatus, complete (a) 1 per battery and per battalion headquarters.
4. Wire, field, twisted pair, 11-strand, (a) 30 per battery and battalion; 20 per regimental headquarters; 40 per brigade headquarters.
Type W, miles.....

Equipment to be Added

5. Headsets, double receiver, breast transmitter (a) 18 per battery; 8 per battalion headquarters.
6. Headsets, single receiver, breast transmitter (a) 10 per battery! 6 per battalion headquarters.
7. Terminal Blocks, telephone, 3 post.... (a) 12 per battery; 6 per battalion headquarters.

c. That the Signal Corps be requested to develop for issue to mobile sea-coast artillery units a double-receiver breast-transmitter headset and a single-receiver breast-transmitter headset of the highest efficiency obtainable.

d. That the Signal Corps be requested to investigate the practicability of obtaining a long-life, light-weight, easily portable storage battery for local battery use with field telephones.

ACTION BY CHIEF OF COAST ARTILLERY*First Indorsement*

War Department, O. C. C. A., August 26, 1924—To the Chief Signal Officer:

1. Herewith for your consideration are the Proceedings of the Coast Artillery Board on Project No. 242, "Communication System for Mobile Seacoast Artillery for Firing on Moving Naval Targets."

2. The recommendations contained in Paragraphs 21-a, b and c of these proceedings are concurred in.

3. In view of the recent advancements made in dry cell battery design, it is not believed desirable to investigate the practicability of obtaining a storage battery for use with field telephones as recommended in Paragraph 18-d of the attached proceedings. It is believed that dry cell batteries of the latest improved type would be preferable for this purpose.

BOOK REVIEWS

The Genesis of the War. By the Right Honorable Herbert Henry Asquith. Geo. H. Doran Co., New York. 6"x 9". 405 pp. Price, \$6.00.

This work, which has been reviewed extensively (as well as favorably) in the daily press and the monthly magazines, is of special interest to the student of military affairs, for whom the accompanying comment is intended.

In his speech at the opening of the German Reichstag in December, 1914, the Imperial Chancellor, Herr Bethman-Holweg, said:

"In the course of centuries the English insular way of thinking has evolved the political maxim that England had a right to 'Arbitrium Mundi' which she can only uphold by an unrivalled power on the Continent."

While this assertion is perhaps not irrefutable, it is to some extent evaded by British writers on the subject of war guilt. Mr. Asquith's work reveals perhaps some faint evidence of such a traditional attitude, but quotes from "Albert Ballin" a note dated 1911 and in the Kaiser's own hand, containing this passage:

"We simply are Central Europe . . . To this the British object because it absolutely knocks to pieces their theory of the 'Balance of Power'."

British diplomacy is shown as sometimes awkward, but almost always well intentioned, and evidence is lacking as to that "Machiavelian skill" with which William Hohenzollern claims he was driven into the war.

Mr. Asquith is calm, crystal clear, almost unanswerable, but ever British and not always dispassionate. His viewpoint is not novel, in fact very little of the matter is absolutely new, but recourse was had to authentic sources of information, the presentation is logical, and nothing essential to a complete outline of British policy in European affairs and for imperial defense for the decade preceding the World War, seems to have been omitted.

Special effort was made to obtain from government archives and living statesmen of all three states concerned, conclusive refutation of the ridiculous story of the "Gentlemen's Agreement" of 1897 by which the United States was bound morally, if not legally, to go to the assistance of France and Great Britain, and that wildly improbable yarn is proved all but impossible.

Three full chapters are given to William of Hohenzollern, and a logical case made for an interesting and not entirely unfavorable estimate of that brilliant and unstable character. Only one chapter, but a very interesting one, is needed for the three German ambassadors, Metternich, Marshall, and Lichnowski, and the chapter entitled "Mr. Page—Colonel House" is perhaps the most fascinating of all.

The military reader will be especially interested in "Pre-War Preparations." Here are presented the conclusions affirmed October 22, 1908, by the Committee

on Imperial Defense which Mr. Asquith says were "carefully kept in view during the years which followed." Briefly, these conclusions were:

- (1) With naval supremacy assured invasion is impracticable.
- (2) If command of sea is lost permanently, subjection of the country to the enemy is inevitable.
- (3) Home defense force must be large enough not only to repel raids, but to compel use of a substantial hostile force for invasion.
- (4) With ample margin, such hostile force may be assumed to be 70,000 men.
- (5) New organization of army at home will provide force sufficient to deal with 70,000 within six months, in case of war requiring 100,000 regulars to be sent from United Kingdom to India.
- (6) If territorial force is embodied at outbreak of war, there will also be enough regulars and trained territorials within six months to make practically certain that invasion with smaller force will not be attempted.

No doubt the reader will remember that during more than three years of the War the size of the force maintained in the United Kingdom can be explained only by a constant fear of the invasion of England by a force of ten times 70,000 men.

There follows a summary of the address of Sir Edward Grey to the Committee of Imperial Defense including the "Dominion Delegates," on May 26, 1911, pointing out:

- (1) That *public* friendship with Germany was possible only if France and Russia were parties.
- (2) That the Empire might be forced into war to prevent a combination of powers from acquiring such a dominating position on the Continent as to become "the arbiter not only of peace and war, but of the diplomacy of all the other Powers of Europe."
- (3) That British Imperial Policy recognized that command of the sea would permit territorial aggression by (and only by) a state or group of states having a powerful land force.

The development, apparently in consequence of the German naval expansion, of the policy of united measures for the defense of the British islands and overseas dominions is outlined, and it is made clear that consideration was actually given to the building up of an adequate army, but it was concluded that "any government which proposed it would have committed political suicide."

The paper and typography are excellent, the style readable, and the appendices interesting and important. The reviewer believes every army officer should read this book.

In connection with this subject, there are recommended to the reader a presentation in the *New York Times Current History* for November, 1924 of the Kaiser's present views, and a translation published in *The Living Age*, November 8, 1924, of an article on "War Guilt and War Lies" from the Vienna *Arbeiter Zeitung*.

The Real John Burroughs.: By William Sloane Kennedy. Funk & Wagnalls Co., New York. 5½" x 8½". Illustrated. 250 pp. Price, \$2.50.

John Burroughs is the great commoner in the field of natural history. A self-educated, convention-despising, home-loving man, he observed closely and reported not only accurately, but with the poet's soul that which he saw.

His own environment appealed to him more than any other so of that which resembled it he wrote best. He was not at home in the tropics or the mountain wilds. England only, because of its homelike scenes pleased him after his own Hudson uplands. So of the places he did not care for, he reported the wild life neither at length nor accurately.

Mr. Kennedy, who apparently loved Burroughs, has not flattered him—even is, at times, a little sharp in his criticism, but on the whole he gives us a clear-cut, well-defined notion of the character of the man and the value of his works.

2000 Miles Through Chile. By Earle Chapin May. The Century Co., N. Y., 1924.
5½" x 8¼". 462 pp. Illustrated. Price, \$3.50.

“2000 Miles Through Chile,” by Earle Chapin May, gives a rambling account of present-day life in Chile. To the student of South American affairs, the book brings out many points of interest and value concerning Chile, its inhabitants, political and business life. To the general reader, the rather disconnected narrative has a certain appeal due to the personal note introduced by the author in the recital of the experiences of himself and his wife in such varied surroundings as the drawing room of the Presidente, an Araucanian Indian fiesta, and the nitrate desert of the Antofagasta region. The book is given added present interest by the recent forced resignation of the president, Don Arturo Alessandri.

Ways to Peace. Charles Scribner's Sons, New York, 1924.

In *Ways to Peace* are published twenty plans selected from the “most representative” of those submitted to the American Peace Award for “the most practicable plan by which the United States may cooperate with other nations to achieve and preserve the peace of the world.” In a preface, Mr. Edward W. Bok, founder of the award, frankly admits that he expects nothing, but that he hopes for “Not a miracle. Not a universal solvent. Merely a beginning.” An introduction by Miss Esther Everett Lape, Member in Charge of the Policy Committee, gives an interesting classification and analysis of the plans received in the competition.

In no other single volume, perhaps, can one be brought to a better appreciation of the great diversity of opinion that exists concerning the problem of inducing man to live at peace with his kind. The authors are men and women of wide experience, authorities in their respective fields, and prominent in national and international affairs. Their opinions are entitled to careful consideration. Their ideas cannot be lightly rejected. Yet their plans for the preservation of peace have but little in common. Severally, the plans are most interesting, well thought out and well presented; collectively, they demonstrate the futility of attempting a complete solution of the problem of maintaining perpetual peace until we can more nearly approach unanimity of opinion concerning the cause and cure of war. The list of authors includes: Edwin Borchard, Christian A. Herter, William S. Culbertson, Gutzon Borglum, Samuel Peter Wilson, Miss M. Cary Thomas, Simeon Strunsky, Charles W. Eliot, Ernest Bruncken, Gen. John McA. Palmer, David Starr Jordan, Manley O. Hudson, J. Whitla Stinson, David Atkins, Theodore Stanfield, Ernest Joseph Howe, Rt. Rev. Charles H. Brent, Nathan Isaacs, Paul H. Arthur, and Charles Herbert Levermore, author of the winning plan.

The authors, with one exception, direct their efforts toward the control of international war and disregard the fact that there are two kinds of war requiring correspondingly different agencies for their control and the equally important fact that civil wars have, throughout the ages, accounted for a greater loss of life

and more bitterness and pain than have international wars. Mr. Howe classifies wars as revolutions and foreign wars, forgetting that, while revolutions are civil wars, civil wars are not always revolutions. General Palmer presents the only plan that would be efficacious in the preservation of domestic peace.

In general, the plans may be classed as political, economic and educational, with a tendency in some cases for the first two to merge, since economic questions may readily become political. There is a somewhat general agreement on the necessity for the codification of international law and for the establishment of some form of international court or other body of similar character, as the Permanent Court of International Justice or other purely legal court with or without sanctions, courts of arbitration, conciliation or mediation, conferences, councils, commissions, and so on. Beyond these points the plans diverge.

Some of the plans are based upon the human nature of today; others look well into the future. Some propose to enforce peace; others believe that weight of public opinion will be sufficient. Some are designed for immediate effect; others operate slowly and progressively. Some offer a complete solution; others contain only a beginning. But, however inadequate to the preservation of universal peace the several plans may be, most of them contain ideas or proposals which, if adopted, would tend to reduce international friction and, to a corresponding extent, to decrease the probabilities of war between nations.

A solution is offered in the control or coordination of world trade by an Economic Association of Nations (Borchard), an International Corporation (Bruncken), the control of waterways to the high seas (Borglum), a scientific medium of exchange (Atkins), or free trade (Howe). Some would declare war a crime and outlaw offending nations (Miss Thomas), try offending nations (Herter), or try the makers of war (Stanfield). Conferences (Culbertson, Eliot) or treaties (Stinson) appeal to others. Cooperation with the League of Nations (Hudson, Levermore, Brent) or qualified membership therein (Hudson, Strunsky) is proposed. Education for peace (Miss Thomas, Jordan, Arthur), even to the extent of rewriting history (Brent), is advocated. General Palmer desires the adoption of a modification of the Swiss military system. Professor Isaacs proposes the use of national courts to settle international questions, abolishing the doctrine of non-suability. Mr. Wilson advances the organization of scientists and technicians into a "technocracy" which would go on strike upon the outbreak of war. And Dr. Jordan believes in a Bureau of Conciliation in the Department of State. To be complete, the list should include a discussion of a mutual guarantee against aggression as a possible solution, since this plan has had some little success in the limited field in which it has been tested.

It is not practicable here to discuss the separate plans. Volumes might be written arguing the weakness of public opinion as a weapon between nations, pointing out the possibilities of tyranny or of insurrection in the creation of a super-state with power or of its impotence if without power, considering the unfitness of law courts to decide political questions and the infrequency with which purely legal questions cause war, going into the difficulties of international coercion by means other than military, of apprehension of makers of war, of trying and punishing nations by criminal courts, of world-wide education for peace, and of other questions which naturally arise. These questions are, in general, not considered and treated in full in the solutions offered; nevertheless the plans are well worth careful study. In preparing them for publication, Miss Lape has added to our literature on the subject of peace and war a volume which should not be overlooked by any person interested in the perpetuation of international peace.

The Old and the New Germany. By John Firman Coar. Alfred A. Knopf, New York. $5\frac{1}{2}'' \times 7\frac{3}{4}''$. 288 pp. Price, \$2.50.

The old and the new Germany; different in government and ideals, but still, under the skin, the same union of an "ewig" German people. Coar has studied deeply, and in this book gives us the benefits of his research. If we are ever to be able to live in love and sympathy with our neighbors we must understand their viewpoints and aims in life. This book is written, not to appeal to a popular vote, but to give a few needed facts about a large proportion of Europe's population. The Constitution of Weimar is compared with our Constitution in all its phases, but the differences in social order are brought out very carefully. Germany may be a democracy as far as government is concerned, but no German believes, or wishes to believe, that all men are born equal. Class distinction has been too long ingrained upon them to be overthrown in a moment. The laborer, the farmer or the mechanic is content to let his country be run by men trained for that by birth and education. The book gives us each stage of the aftermath of the war in logical sequence. First, there is a resume of German Kultur and Pan-Germanism before the war, then chapter by chapter, Coar shows Germany's development from the Kaiser's abdication to the summer of 1923. Reading it gives one an idea of what is hoped for Germany by her leaders. Their aims are high and evidently they are not in sympathy with the Soviet. But their task is a hard one, with every nation's hand against them. Two nations, Germany and Russia, are holding forth ideals of liberty, justice and community service. America cannot ignore them if we are to be looked up to as the land of the free. Read the book and wonder if, perhaps, the seed of a great ideal is not being planted in Germany the New.

Germany, France and England. By Maximilian Harden. Brentano's, New York. 1924. 326 pp. Price, \$2.50.

Maximilian Harden has, in this book, spared no one's feelings, as to the cause of the conditions which exist in Europe now, and which have existed since the signing of the Versailles Treaty. In the beginning of his book, Harden goes back to the peace of 1871 when Bismarck dictated his terms to the French. Clearly he believes the French attitude at that time was far better than the present attitude of Germany. Germans have never willingly admitted their defeat, nor, according to Harden have they made an honest effort to meet the requirements of the Reparations Committee, even though they agreed to them at that time. Harden appears extremely bitter against his countrymen, blaming them far more harshly than writers of other nations. No Latin-American country is (according to him) as full of graft and corruption as the present German government—no member of which seems to have the requisite brains or integrity for real leadership. According to Harden, the overworked printing presses turning out billions of worthless paper marks have uprooted any faith foreigners may have had in Germany. That Germany should pay, and that France had the right to go into the Ruhr to enforce the payment, he believes absolutely. But England does not fare so well at his hands as France. England is always a bugaboo to a German, so in this book we are told that England could have prevented the occupation of the Ruhr, but that she does not wish a cordial working out of difficulties by France and Germany; a trade relationship which would help both nations, trade being in Harden's eyes, England's god. Harden's dislike of the Kaiser and his rule are well known, and his bitter feelings towards the present government is shown in all his writings. He says that a United States of Europe

will be the only solution—for peaceful trade relations and for the establishment of permanent peace. Perhaps that will be the ultimate solution of the question.

Harden's book is interesting and instructive to anyone who wants some knowledge of European affairs, and is well worth reading. The style is difficult (especially for rapid reading) and one judges that the translator, William C. Lawton, had his own troubles, but it has the virtue of sincerity notwithstanding on either side, Germany bearing the brunt of the attack. "To the Out-land deny everything" is the password in Germany now and has been for years, but Harden denies nothing and puts the blame where he sees it to belong.

Super-Power as an Aid to Progress. By Guy E. Tripp. The Knickerbocker Press, New York. 1924.

This little 60-page booklet is an untechnical, appealing presentation of an interesting and thoroughly modern subject. Its outstanding characteristic is the author's sincerity and earnestness.

Super-power, defined, is the replacement of small isolated power plants by large unified systems covering wide areas and receiving power from steam and water power plants of maximum capacity and highest efficiency. The proposition is here argued from the standpoint of the statesman, the sociologist and the engineer.

Having completed his presentation the author feels justified in stating: "Though the super-power plan is practical and desirable, both technically and economically, and is already in the process of development, it will not be realized in its entirety until public opinion is fully in favor of it." So, like Dr. Johnson and his dictionary, Mr. Tripp, having argued the need of propaganda favoring super-power, produces as neat a bit of propaganda as is likely to come out.

In spite of the fact that the book is a compilation of several articles and papers that have been previously published or delivered separately, its singleness of earnest purpose suffices to bind it into a logical unit. Type, paper and decorative illustrations combine to set off an attractive book.

Cadence System of Close Order Drill. Revised edition. By Major Bernard Lentz, Inf. Geo. Banta Publishing Co., Wisconsin. 1924. $5\frac{1}{4}'' \times 7\frac{1}{2}''$ 121 pp. Illustrated. Price, 75 cents.

Based on the new Training Regulations, including the latest amendments. Contains many diagrams and other helpful information not found elsewhere. The Cadence System is in full accord with the Training Regulations. Every footstep in every close order movement is illustrated. The system has stood the acid test of time as a method for teaching correct, precise and enjoyable close order. During the World War, such well-known military authorities as Generals Helmick and Shanks used the system to train entire divisions. After the war, General Harbord, after training six thousand recruits by this system, pronounced it "the best and most practical system yet devised." The Infantry Board, in approving the method, sums up as follows: "It has a great value as an aid in training, particularly during the elementary stages. It teaches men the proper timing of commands and makes for uniformity of movements. It is valuable in developing the command voices and arouses enthusiasm, especially among young men and recruits. It has its greatest value in the training of R. O. T. C. and C. M. T. C. units." Every military instructor should make use of this practical system.